

MODIS

Science Data Processing Software

Version 4.0 System Description



Volume III – Sections 5 – 7
Appendix A – C

May 2004

SDST-119B

MODIS
Science Data Processing Software
Version 4.0 System Description

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Change Record Page

This document is baselined and has been placed under Configuration Control. Any changes to this document will need the approval of the Configuration Control Board.

Document Title: MODIS Science Data Processing Software Version 4.0 System Description			
Document Date: March, 2003			
Issue	Date	Page Affected	Description
REVIEW DRAFT	3/25/99	All	Baseline
FINAL REVIEW	5/20/99	All	Baseline
REVISION A	6/30/01	All	Baseline
REVISION B	5/31/04	All	Baseline

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Volume III – Sections 5-7

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MODIS

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5. PRODUCTION RULES

Production rules are a set of formal instructions that direct a data processing system in executing the production software. The ECS Production Rules were originally provided by ECS for Release B.0 and were intended to be used for processing the data for all EOS instruments at one of the DAACs using the ECS PDPS. These ECS Production Rules are used by the MODIS Level 1 PGEs at the GES DAAC. The ECS production rules are listed and defined in Appendix C. MODAPS runs the higher level PGEs using many of these basic production rules. However, the implementation at MODAPS is different. In addition to the basic production rules, MODAPS implements many customized production rules specific to a PGE and many combinations of the basic production rules that are not implemented in the ECS. The current MODAPS Production Rules are also listed and defined in Appendix C.

Both the ECS and MODAPS Production Rules can be considered as basic building blocks to be used to construct a data processing scenario for a PGE. The Production Rules and values assigned to parameters in order to process the MODIS Level 1 PGEs and PGEs for other instruments for the ECS PDPS are fine-tuned at SSI&T at the DAACs. The MODAPS Production Rules required for processing MODIS Level 2 to Level 4 PGEs are provided to MODIS SDST by the MODIS software developers, evaluated and refined by SDST, implemented by the MODAPS developers, and fine-tuned by MODAPS Operations. Thus the high-level description of the Production Rules for each PGE and the detailed descriptions of Production Rules delivered with the PGE may be considered as initial guesses for an optimization process which builds the PGE's data processing scenario.

5.1 Top-Level Construction of Data Processing Scenario

The construction of the processing scenario begins with a determination of the top-level Production Rule or in some cases rules to be used for the PGE. All PGEs require a temporal production rule. Some PGEs also require a spatial production rule. The selections are made from the following ECS Production Rules:

- Basic Temporal
- Period (Calendar) Specification
- Period Start_of_N_Days Specification
- Orbit-Based
- Latitude/Longitude Tiling
- Zonal Tiling

Since only the MODIS Level 1 PGEs are run at an EOS DAAC, only the ECS Production Rules and related information that are applicable to the Level 1 PGEs will be discussed with relation to the DAAC implementation in Section 5 of the Version 4.0 MSDPS SDD document. The primary production rules for MODIS Level 1 PGEs are Basic Temporal, Advanced Temporal, and Optional Inputs. Some information about ECS Production Rules that appeared in previous versions of the document has been deleted.

The Basic Temporal activation is based on the start and end data dates and times for the output data. Examples of production software using Basic Temporal are L1 and L2 PGEs. The two types of period specification allow for processing on a calendar period (i.e., day, week, month or year) or on a selected cycle of a set number of days (i.e., 8, 16, 32 or 96 days). Examples of production software using period specifications are L3 and L4 PGEs.

For the Orbit-Based Production Rule, MODAPS maintains orbit numbers and corresponding temporal ranges in the database. MODAPS stages input data using its database and makes the database information available for use by the PGEs.

Information for the Tiling Production Rules must be provided to MODAPS in separate tile description files which are called tile schemes. The current Latitude/Longitude Tile specification file requires Tile ID numbers and the bounding latitude/longitude coordinates for each tile. The Zonal Tiling will be implemented by specifying the latitude coordinates which bound the zonal tile.

The production systems use two basic strategies for determining when to activate a PGE for a specific data date and time period. The first strategy is incorporated into production rules that are based solely on time. The second strategy is incorporated into production rules based on a tiling scheme which is to be invoked periodically.

For PGEs which have top-level production rules based solely on time, the activation is data driven by the availability of the required input granules. The Level 1 PGEs that are run at the GES DAAC are scheduled to run according to a specific temporal period. The input Level 0 data arrive every 2 hours, but the GES DAAC Operations plan and schedule the processing for 15 minute periods within the 2-hour Level 0 data file. The ECS Planning and Scheduling System breaks up the PGE processing request on a regular schedule into DPRs on nominal time boundaries of 5 minutes. The PDPS keeps track of the data granules required by the PGE for the processing period of the DPR as the granules arrive on the Data Server. Using a correlation algorithm, the PDPS determines the best match of the start and stop times of each arriving on the Data Server with the start and stop times of the scheduled DPRs over the length of time for which the data processing was planned. Once all of the required input granules have arrived, the clock is set and timers may begin for other types of input.

At MODAPS the PGEs are grouped into Recipes according to MODIS Science Discipline, PGE dependencies, and common production rules and features. MODIS has two types of PGEs that are processed according to the first basic strategy. Production analysts perform production planning for Recipes containing Level 2 PGEs on a daily basis. MODAPS Operations schedules the recipes in the daily plans and the production

system breaks the recipes into recipe instances which run the PGEs for the 5-minute data periods as the input data become available. Many Level 3 and Level 4 PGEs that are run by MODAPS are planned and scheduled to run periodically (i.e., once every orbit, daily, once every 8-days, once a month, once a year).

For PGEs that have a top-level Production Rule based on tiling, MODAPS uses the second basic strategy. Production analysts perform the production planning for recipes with L2G to Level 4 PGEs over periods ranging from daily to yearly for a predefined set of tiles associated with the PGEs in the recipe. The PGEs are run for all the tiles, one tile per PGE execution. The PGE activation is based upon a combination of the actual data period covered within the granules in the processing period and the time required for MODAPS to generate all of the possible input products for the PGEs. The MODAPS database has an operator delay field for each PGE that contains a delay time. This delay time is a reasonable time for Operations to wait for all possible input before activating the recipe and PGEs within the recipe. For most PGEs, the delay time is set high and Operations, with input from the Science Discipline, activates the recipe based on knowledge of output from upstream PGEs. A recipe instance is deleted if there are no inputs available to the PGEs. For the tiled products this generally means the tile was not observed during the processing period.

The ESDT data sets associated with the PGE are categorized at the top level as input products and output products. The top-level production rule selected above includes implications for both input and output to the PGEs. Output products are in general produced for the basic processing period associated with this top-level production rule. Some, but not all, input products are acquired for the same time as the basic processing period of the PGE. Other input products are additionally acquired before and after the time of the processing period.

5.2 Additions of Other Production Rules for the Data Processing Scenario

Data processing for actual PGEs requires some perturbations on the top-level Production Rule. Other Production Rules from Appendix C for MODAPS and the GES DAAC may be added to the production scenario for the PGEs. Many of these other production rules are associated with the input products to the PGEs. The input products are further classified as the following types:

- Required - Mandatory input with no alternatives; PGE will not run without it.
- Optional - Not required input; PGE will run without it.
- Alternate –An alternative data set can be used in the PGE run. One alternate must be available for the PGE to run. The first choice data set is considered to be the primary and is staged for the PGE if available; otherwise the alternate data set is staged.

All optional input products have an associated wait time for their availability. The required input products have an implied top-level timer so that timers for the other types of inputs can be set relative to it. This top-level timer is set for Level 1 PGEs when the first required input Level 0 2-hour granule arrives on the Data Server at the GES DAAC.

The DAAC processes 15 minutes of data at a time. The top-level timer is set for most Level 2 PGEs when the set of Level 1 MODIS granules for a 15-minute period are ingested at MODAPS and for most Level 3 and 4 PGEs when the input granules corresponding to their output data period are generated from the immediate upstream PGE or PGEs at MODAPS. Sometimes there are multiple PGE dependencies at MODAPS. For cases of late or missing data, the scheduling of the planned recipes for a data processing period requires decisions by MODAPS Operations and the Discipline Data Teams.

5.3 *Optional Inputs and Alternate Inputs*

If the PGE has optional inputs, the Optional Input Production Rule is selected in addition to the top-level rule for the Data Processing Scenario. The PGE is expected to be able to run with or without the optional inputs. If the PGE has alternate inputs, the Alternate Input Production Rule is also selected. The Alternate Input Production Rule selects the order for the choices of data sets and associates a timer with each choice. The wait times for each PGE are requested by the Science software developers at the SCFs.

The time-outs for the optional and alternate inputs depend on the implied wait times for the required inputs. The Optional and Alternate Input Production Rules operate according to the following algorithms:

- Timer for optional inputs begins only after all the required inputs are known to be available. Time-outs for multiple optional inputs are concurrently counted down.
- Timer for the Alternate Inputs begins only after all the required inputs are known to be available. Time-outs for alternate inputs run consecutively.

5.4 *Minimum Number of Granules and Associated Time-outs*

In reality, not all of the granules of any type of input may be available, even after a reasonable waiting period. Since the PGE can run with part or none of the optional ESDT input products, this is not an issue with optional inputs. This situation of non-available input granules must be considered particularly for the required ESDT input products. The Science Team may want to run the PGE anyway with only part of the required granules. For this case, the Minimum Number of Granules Production Rule is selected for the scenario.

The use of minimum number of granules for a PGE requiring a top-level Production Rule based solely on time produces different results from a PGE requiring a top-level Production Rule based on tiling. Minimum numbers of granules are generally set for required inputs and alternate inputs to a PGE with the time based activation and no production rule based on tiles. The following results are obtained for each of these types:

- **Required Inputs:** If a minimum number of granules is set along with a timer for the required inputs, the PGE will be scheduled to run at the end of the time-out if at least the minimum number are available. To give the required inputs a reasonable chance to arrive, the PGE will not be run before the time-out unless all are available. It is up

to the Science Discipline Groups to keep the timers for multiple required inputs in sync.

- **Optional Inputs:** The capability of setting a minimum number of input granules for optional inputs was not implemented since it is not really applicable.
- **Alternate Inputs:** If a minimum number of input granules is set with a timer for each alternate input, the timer for next choice starts if the minimum number of inputs is not available for the current choice. If the higher priority alternate becomes available (due to arrival of at least the minimum number of input granules) during the wait period for the lower priority alternate, the PGE will be activated with the higher priority alternate input. The final choice should be a long-term or static file that is always available.

For a PGE with activation based on the Latitude/Longitude Tiling Production Rule, setting a minimum number of granules for input ESDTs would cause the scheduled MODAPS recipe instance to be deleted at the time of a system query for availability of inputs if the minimum number were not available. This is not a desirable result if the objective of setting a minimum number was to delay the processing until a sufficient number of granules are available. There are many processing periods in which only one input granule is expected in a tile. This occurs primarily for tiles near the equator. Thus, the minimum number of granules for the tiling PGE is set to one. However, in some cases for multiple-day PGEs, the MODIS discipline groups have requested a minimum of 2 daily input granules for the tile.

5.5 Metadata-Based Activation and Metadata-Based Query

MODAPS provides the capabilities of conditional activation of PGEs and selection of granules of particular ESDTs for staging based upon a metadata query on ECS Inventory Attributes and PSAs. The Metadata-Based Activation Production Rule determines whether the PGE is executed or not. The Metadata-Based Query Production Rule controls which granules of a particular ESDT are staged for the PGE run, such as day mode data only. This Production Rule is specified in the PGE Loaders which are installed at MODAPS at the time of the PGE delivery.

The required parameters for both of these rules are the name of the ECS Inventory Attribute or PSA in one or more ESDTs, an operator for the query or checking, and a value for the check or comparison. Checks and queries may be specified for more than one ESDT input to the PGE and on more than one Inventory Attribute and PSA. Multiple metadata checks and queries are implemented as a logical “AND” capability. There is currently no logical “OR” capability.

5.6 Runtime Parameters

Runtime parameters to be used by a PGE must be specified along with a logical unit number (LUN) in the PCF for the PGE. Some runtime parameters are set by the data processing system and dynamically inserted into the PCF when the PGE is executed. These are called dynamic runtime parameters. Many runtime parameters are used to

direct the PGE to perform in multiple ways, such as to produce a different set of products. Most of these runtime parameters are static; they are not intended to be changed when the PGE is executed. Static runtime parameters are those that are fixed for a particular version of a PGE that is installed at the GES DAAC or at MODAPS.

The information from the PCF for Level 1 PGEs is automatically put into the ECS PDPS Database by SSI&T software when the PGE is delivered and registered at the GES DAAC. However, the ECS PDPS allows overrides of the runtime parameters to occur when the production requests are entered. The ECS PDPS generates the instantiated PCF for a PGE run, populates the static runtime parameters in the PCF with values from the database, and populates the dynamic runtime parameters with values known to the PDPS at the time the PGE is executed.

At MODAPS the PGE Perl script generates the instantiated PCF for the PGE run, inserts the values for the static runtime parameters that are embedded in the script, obtains the dynamic runtime values from MODAPS and inserts them in the PCF, and then activates the PGE execution.

Values for several dynamic runtime parameters are supplied by MODAPS and ECS PDPS to the PGEs at the time they are executed. The actual names of the dynamic runtime parameters may vary between MODAPS and ECS, but the meanings are the same. PGE scripts, designed to perform various functions at runtime, are responsible for reading the values supplied by the production system and inserting the values into the appropriate runtime parameter associated with a logical unit number in the PCF. The dynamic runtime parameters input by the production system and available for all PGEs are the collection start date and time, the collection end date and time, the satellite on which the instrument is mounted, and the processing environment.

- Start Collection Date Time – Start date and time for the data observations.
- End Collection Date Time – End date and time for the data observations.
- SatelliteInstrument – Spacecraft platform for the MODIS Instrument supplied by the data processing system. Value = AM1M for Terra and PM1M for Aqua.
- ProcessingEnvironment - Computer platform on which PGE is run; determined by the ECS PDPS at the GES DAAC or PGE Loader module at MODAPS via a system call.

5.6.1 MODIS Land Tiling Runtime Parameter

The MODIS Land PGEs that require the Latitude/Longitude Tiling Production Rule may make use of dynamic runtime Parameters known to the MODAPS Database as “TileID.”

- TileID - Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme); available at MODAPS.

The PGEs using the Tiling Production Rule execute once per tile for every data processing period. The tiles are defined by a set of latitude and longitude coordinates and a Tile ID number in a tile definition file, called a Tile Scheme. In order to make use of this runtime parameter, the PCF for each of these PGEs must contain a Tile ID runtime parameter with an associated logical unit number. This runtime parameter will

be specified in the PGE Perl script that is delivered with each version of the PGE code. With each execution of the PGE, MODAPS makes the value of the Tile ID available to the PGE script. However, the PGE script must have a LUN allocated for the Tile ID in the PCF in order for the PGE to make use of it.

5.6.2 MODIS Ocean Data Day Runtime Parameters

The MODIS Ocean PGEs which require the Data Day Production Rule will make use of the dynamic runtime parameters known to the MODAPS Database as “start dataday” and “end dataday.” MODAPS incorporates an algorithm provided by the MODIS Oceans Group for determining each Ocean Data Day and tracks the Data Days for production. Delta offset times on both sides of the processing period are specified in the MODAPS Database using the Advanced Temporal Production Rule for use by the PGE Loaders that are installed in MODAPS. For each run of these Ocean PGEs, MODAPS stages the correct amount of data on either side of the GMT day for both day and night mode executions, using the “start dataday” and “end dataday” as limits for a Metadata Query on the Data Day PSA in the Ocean L3 products. Both daily and multiple day Ocean PGEs require the Data Day Production rule. At runtime, MODAPS returns the values of the “start dataday” and “end dataday” in the runtime parameters defined with associated logical unit numbers in the instantiated PCF. For daily PGEs, the start and end datadays will be equivalent.

5.7 Latitude/Longitude Tiling

The MODIS Land Science Software requires tiling production rules starting with the processing of the L2G products. For a PGE to use the Latitude/Longitude Tiling Production Rule, a tile scheme must be defined for use by the PGE in the MODAPS Recipe. The tiling schemes are defined in files delivered by the MODIS Land Discipline Group and registered into the MODAPS Database. The boundaries for each of the MODIS tiles in the schemes are defined as four sets of latitude and longitude coordinates. Many different tiling schemes are allowed in the system, but each has a separate tile definition file.

5.7.1 Tile Definition File

Each tile scheme has a unique tile scheme number which has been entered into the MODAPS Database along with information defining the tiles. The parameters in the tile definition file for each tile scheme are the following:

- Tile Scheme Number - A number associated with the tile scheme.
- TileID - A 32 bit integer with a unique value greater than 0 and less than the maximum for a 32 bit integer. A TileID value is listed for each tile in the scheme. Values should be listed monotonically; they do not need to be consecutive integers. MODIS plans to use an eight digit integer with the following encoded fields:
 - Digit 1 - Projection (Valid: 1 = Integerized Sinusoidal, 2 = Goode’s Homolosine, 3 = Lambert Azimuthal Equal-Area with projection center at the North Pole, 4 = Lambert Azimuthal Equal-Area with projection center at the South Pole, 5 = Sinusoidal).

- Digit 2 - Tile Size (Valid: 1 = full size tile, 2 = quarter size tile, 4 = one-sixteen size tile).
- Digits 3-5 - Horizontal Tile Cell Number in the matrix.
- Digits 6-8 - Vertical Tile Cell Number in the matrix.
- MODIS tiles have four tile coordinates. The coordinate objects for each tile in the Tile Definition File must be specified in clockwise order. Each Tile Coordinate object has an associated Latitude and Longitude.
 - Latitude - A floating point number representing the latitude coordinate of a point defining the tile boundary (Valid Range: -90.0 to +90.0).
 - Longitude - A floating point number representing the longitude coordinate of a point defining the tile boundary (Valid Range: -180.0 to +180.0).
- Tile Description – A brief description of the purpose of the tile scheme, generally including geographical areas for which tiles in the scheme are defined and type of PGEs that use the tile scheme.

5.7.2 Latitude/Longitude Tiling Production Rules for PGEs

Every PGE which requires a latitude/longitude tiling production rule must have an associated tile scheme. A PGE may be run in multiple ways using different inputs to produce different products. Thus the same PGE may be associated with different PGE profiles. Each PGE profile may have a different associated tile scheme. There is only one tile scheme allowed per PGE profile and version under MODAPS.

5.8 Advanced Temporal Production Rule

The input products requested for a PGE may include granules of an ESDT which are outside the processing period for the PGE run. The Advanced Temporal Production Rule is provided for this capability of retrieving input files beyond the processing period. Using this production rule, delta times are applied to both the start and end of the processing period to acquire input granules of a specified ESDT. Negative deltas move the date/time backward in time and positive deltas move the date/time forward in time. Different deltas may be applied to each input ESDT. Most ESDTs have a RangeDateTime in the granule Inventory Metadata. The ECS PDPS uses a correlation function to determine the best match of the input granule's RangeBeginningTime and RangeEndingTime with the start and end times of the DPRs. MODAPS uses a similar function to match the times for the input granules to the recipe instances. The algorithm for setting the deltas for the Advanced Temporal Production Rule assumes that the correlation function is extended to the retrieval of granules outside the processing period. Granules of ESDTs with only a SingleDateTime in the granule Inventory metadata are retrieved for a DPR or recipe instance, including the extended delta range, only if this SingleDateTime falls within the extended DPR or recipe instance window. Granules in the extended time periods may be acquired using either the same logical unit numbers or different logical unit numbers from the granules of the ESDT in the current processing period depending on the specific requirements of the PGE.

The following description of the Advanced Temporal Production Rule presents some mathematical algorithms that can be used for selecting the input data to PGEs. These algorithms are based on the delta time information that was required as input to the ECS SDPS at the DAACs for the Advanced Temporal Production Rule. In actual practice MODAPS has implemented the Advanced Temporal Production Rule using its own algorithms that accomplish the same task for some PGEs and in order to simplify the staging algorithms, MODAPS has implemented the Advanced Temporal Production Rule for other PGEs by specifying the number of additional files on either side of the processing period, sometimes over-staging the number of files that are needed by the PGE runs. The PGE scripts make allowance for this in the PCFs. The mathematical algorithms are retained in this document partly to give some insight into the variety of data time coverage encountered in the many types of input external ancillary data and the complexity of matching the data time coverage to the processing period of the PGEs and partly to allow verification that the correct files are staged for PGEs.

The Advanced Temporal Production Rule can be used with EOS Instrument products, such as MODIS products, and with external ancillary data sets. The MODIS products generally have an associated RangeDateTime in their granule level metadata corresponding to the actual valid range of coverage of the data within the file. Granules of these input products on either side of the processing period are retrieved by specifying a delta time that is a simple multiple of the date/time range covered by the input granules. Any input granule whose RangeDateTime overlaps the window between the start and end delta times is retrieved for the PGE run. Any ancillary data sets that have a RangeDateTime in their metadata corresponding exactly to the actual data in the file may be retrieved using the same algorithm.

The general form of the algorithm for retrieving any type of input data set to match the data being processed in the DPR or recipe instance plus additional input data outside the processing range of the DPR or recipe instance is shown below. Even if the processing system does not implement the algorithm exactly, it can be used for verifying the correctness of the files actually staged for a particular PGE run.

$$S_{del} = (n * r) + i - p/2$$

$$E_{del} = (n * r) + i - p/2$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside of processing period

- r = range of time covered by input file or granule
- i = offset time interval representing a difference in the temporal metadata and the actual time range over which the data in the input files are valid
- p = nominal range of time covered by a granule of required product input for processing period for which matching ancillary files are retrieved by a single time (generally the same as processing period)

The “i” offset time interval is an artifact of the ancillary data set itself. There is a difference in the temporal metadata and the time range over which the data are valid.

The “p” time range is an artifact of the finite time interval between the start and end time in the metadata for the granules of Science Instrument data being processed in the PGE run.

The use of the Advanced Temporal Production Rule with external ancillary data inputs can be more complicated. In addition to files containing data averaged over the period of time covered by the file, many ancillary data products are provided by models from which snapshots of the data fields are extracted at synoptic times. Other ancillary data products have averaged times appended into files which are generated at definite time intervals, such as daily files. Some of these ancillary data sets contain the RangeDateTime and others contain the SingleDateTime. Different algorithms must be used in setting the delta times for these various types of ancillary data files. All of these can be derived from the general form of the algorithm described above.

The algorithms presented in the SDD are intended as guidelines and defaults for each type of ancillary data. The defaults represent the most common use of the ancillary data sets. The algorithms will stage the input files which contain data that best match the processing period of the PGE and thus the MODIS data being processed in the PGE run. Unless the Instrument team overrides the default usage by specifying other criteria for retrieving the ancillary data files, the default algorithms will be used to specify the deltas for the Advanced Temporal Production Rule at installation of the PGEs at the processing center.

The following cases describe the algorithms for MODIS data types and for each of the time-varying ancillary data types to be staged for the MODIS Science Data Processing. For each example, it is assumed that the PGE requires the input data files that best match the data in the processing period. The PGE may also require some additional files on either side of the current processing period. The science software development team must specify either the number of additional files or the time interval on each side. The examples selected are those that are most relevant to the MODIS data processing.

5.8.1 Case 1: Input ESDT with Associated RangeDateTime Matching the Actual Valid Range in the File

Case 1 applies to most input MODIS products for which both matching and granules outside of the current processing period are required for the PGE run. The NISE and REYNSST ancillary data, which are described in Table 3-4, also fall into this category. NISE is a daily ice and snow product file for which the RangeBeginningTime is set to 00 Z hours and RangeEndingTime is set to 24 Z for the day covered by the file. REYNSST

is a weekly data file of SST data for which the “dd” in the file name is the middle of the 7-day period. The RangeBeginningTime is at 00 Z hours on the first day and the RangeEndingTime is at 24 Z hours on the last day. Some of the daily, upstream time-averaged DAO GEOS-4 data sets fall into Case 1 but the DAO data is discussed separately under Cases 2 and 3 because of some new time-coverage features.

The algorithm which can be used to set the negative delta time on the start and positive delta time on the stop of the data processing period is a simplified version of the general algorithm. There is no offset time interval for these types of input data. Thus, “i” is set to 0. Both MODIS and ancillary data are retrieved by a time range. Thus, “p” is set to 0. The following simplified algorithm is used for Case 1:

$$S_{del} = n * r$$

$$E_{del} = n * r$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside the processing period boundary

r = range of time covered by input file or covered by the interval between the end of one input file and beginning of next input file

Example:

MODIS PGE02 is executed once for each 5-minute granule of MOD03 to produce 5 minute granules of MOD021KM, MOD02HKM, and MOD02QKM. PGE 02 also requires as input, three 5-minute granules of MOD01 (previous, current, and following). To retrieve these three granules of MOD01, the following deltas are set for a DPR with a nominal 5-minute processing period on date 04/15/01:

$$S = 02 \text{ hr } 10 \text{ min } 00.00 \text{ sec}$$

$$E = 02 \text{ hr } 14 \text{ min } 59.99 \text{ sec}$$

$$S_{del} = (1 * 5 \text{ min}) = 5 \text{ min}$$

$$E_{del} = + (1 * 5 \text{ min}) = 5 \text{ min}$$

$$S_{new} = 02 \text{ hr } 10 \text{ min } 00.00 \text{ sec} - 05 \text{ min} = 02 \text{ hr } 05 \text{ min } 00.00 \text{ sec}$$

$$E_{new} = 02 \text{ hr } 14 \text{ min } 59.99 \text{ sec} + 05 \text{ min} = 02 \text{ hr } 19 \text{ min } 59.99 \text{ sec}$$

The time window from S_{new} to E_{new} , which is used for staging files that match the processing period plus one input file on either side show that the MOD01 granules for nominal 5-minute periods starting at 5 minutes, 10 minutes, and 15 minutes are

retrieved for the PGE run. These are the only MOD01 granules whose RangeBeginningTime to RangeEndingTime falls within or overlaps the window from Snew to Enew. These three granules fit the requirements for previous, current, and following MOD01 files.

5.8.2 Case 2: Input ESDT with Associated RangeDateTime and Averaged Times Appended in Each Daily File

Case 2 applies to the DAO GEOS-4 ancillary data of the time-averaged type described for several ESDTs in Table 3-4. The data sets of this type for which there are future plans for use by MODIS are D4FAXCHM, D4FAXCLD, D4FAXENG, and D4FAXSTR. All of these data sets contain eight 3-hour upstream time-averaged parameters appended in a daily file. These are called DAO tavg2d type data. The output for each of the eight Z hours is an average of the previous three hours. The old DAO GEOS-3 versions of these data sets append the 00Z through 21Z data into the daily files. This scheme put the last 3 hours of each day into the daily file for the next day. For PGEs to match the data valid coverage time with the MODIS products, two files needed to be staged for the PGE, the daily file for the current processing period and the one for the following day. The new DAO GEOS-4 versions of these data sets append the 3Z for the current day through the 0Z for the next day into the daily files. Thus the data valid coverage for each DAO file matches the current day, the RangeBeginningTime is set to 00 Z hours, and the RangeEndingTime is set to 24 Z for the day covered by the file.

To retrieve the input DAO GEOS-4 ancillary data which best matches a current processing period for a PGE which processes a 5-minute granule, only the daily input ancillary data file of the type tavg2d for the current day is required. For a daily PGE, the daily input ancillary file of the type tavg2d for the current day is required. The algorithm for setting delta times on the ends of the processing period is the same as in Case 1.

Example:

MODIS PGE06 is executed once for each of 5-minute granule of MOD03 and a matching L1B Calibrated Radiances granule. Some future version of PGE06 also will require matching granules of D4FAXCLD and D4FAXENG ancillary data. To retrieve the ancillary data that best matches the granules of MOD03, the following deltas are set for a DPR with a processing period of date: 10/15/01.

S = 21 hr 00 min 00.00 sec

E = 21 hr 04 min 59.99 sec

Sdel = (0 * 24 hours) = 00 hr

Edel = (0 * 24 hours) = 00 hr

Snew = 15 day 21 hr 00 min 00.00 sec

Enew = 15 day 21 hr 04 min 59.99 sec

The extended range for D4FAXCLD and D4FAXENG from Snew to Enew is the same as the MODIS data processing range. Using the correlation function, the Advanced Temporal algorithm would determine that the Day 15 ancillary granules are the best match for the processing period.

The DAO GEOS-4 D4LAXMNT is a special data set that is generated by the GES DAAC for the Montana SCF by extracting several types of data from other DAO GEOS-4 data sets and appending them into a daily file. The D4LAXMNT data set currently contains 3 upstream time-averaged SDSs and 2 synoptic or instantaneous snapshots SDSs from the DAO model appended into the daily file. The snapshots are taken every 3 hours at 0Z, 3Z, 6Z, 9Z, 12Z, 15Z, 18Z, and 21Z. The data valid coverage is 1.5 hours about the center Z hour. The synoptic DAO data sets will be discussed in Case 3. Matching the data valid coverage range for the daily DAO file with both time-averaged and synoptic data is not as clear-cut as for only one type in the file. If only the time-averaged data SDSs in the file are to be matched to the MODIS processing period, the algorithm for D4LAXMNT would be the same as the one for the other time-averaged data sets listed above. If matching the synoptic data is also important, an additional file must be staged at the end of the processing period for the MODIS PGEs that require this data set. The D4LAXMNT example appears under Case 3.

5.8.3 Case 3: Input ESDT with Associated RangeDateTime and Synoptic Times Appended in Each Daily File

Case 3 applies to the DAO ancillary data of the synoptic or instantaneous type as described in Table 3-4. The data sets of this type used by MODIS are D4FAXMIS of type tsyn2d and D4FAPMIS of type tsyn3d. Both of these data sets contain consecutive synoptic times appended in daily files. The tsyn2d has eight synoptic times (0Z, 3Z, 6Z, 9Z, 12Z, 15Z, 18Z, and 21Z). The tsyn3d has four synoptic times (0Z, 6Z, 12Z, and 18Z). The RangeBeginningTime on each day is at 00Z. The RangeEndingTime on each day is 21Z for the tsyn2d and 18Z for the tsyn3d.

For daily PGEs that require the ancillary data of tsyn2d or tsyn3d that best matches the time of the MODIS data in the processing period, the ancillary file for the next day should be staged in addition to the file for the current day because the last synoptic time in the daily file is valid only to half of the time interval between it and the 00Z hour on the next daily file. For D4FAPMIS, the daily ancillary file with ending synoptic time of hour 18Z is valid up to hour 21Z. For D4FAXMIS, the daily ancillary file with ending synoptic time of hour 21Z is valid up to hour 22Z and 30 min.

A simplified version of the general algorithm describes this case. The term for number of files outside the processing period is included. The synoptic times are the midpoints of the range over which the data are valid. Since several of these synoptic times are packed in a daily file for which a RangeDateTime is associated, only the offset interval time "i" needs to be included.

To retrieve the input ancillary data which best matches the processing period of a MODIS PGE and files outside of the processing period, the following algorithm is used for Case 3:

$$\begin{aligned} S_{del} &= (n * r) + i \\ E_{del} &= (n * r) + i \\ S_{new} &= S - S_{del} \\ E_{new} &= E + E_{del} \end{aligned}$$

where:

Sdel = delta time to be set to start of processing period

Edel = delta time to be set to end of processing period

Snew = start time of processing period with delta time

Enew = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside the processing period boundary

r = range of time covered by the interval between the start of one input file and the start of the next input file

i = range of time covered by one half of the interval between the last synoptic time in one input file and the beginning of the next input file

Example 1:

MODIS PGE06 is executed once for each of 5-minute granule of MOD03 and a matching L1B Calibrated Radiances granule. Future planned versions of PGE06 also may require matching D4FAPMIS ancillary data. D4FAPMIS contains 4 synoptic data snapshots, covering 6 data hours each, appended in the daily file. To retrieve the ancillary data that best matches the granule of MOD03, the following deltas are set for a processing period of date: 10/15/01.

S = 21 hr 00 min 00.00 sec

E = 21 hr 04 min 59.99 sec

Sdel = (0 * 24 hours) + 3 hr = 03 hr

Edel = (0 * 24 hours) + 3 hr = 03 hr

Snew = 15 day 21 hr 00 min 00.00 sec - 03 hr = 15 day 18 hr 00 min 00.00 sec

Enew = 15 day 21 hr 04 min 59.99 sec + 03 hr = 16 day 00 hr 04 min 59.99 sec

The daily ancillary D4FAPMIS file for Day 16 is retrieved because its RangeDateTime overlaps the window between Snew and Enew. The RangeEndingTime of D4FAPMIS on Day 15 at 18Z hours just touches the border of Snew. Using the correlation function, PDPS would determine that Day 16 best matches the PGE processing period beyond Hour 21 of Day 15.

Example 2:

MODIS PGE51 is activated once every 8 days to produce the MOD27W weekly productivity indices from the MODOCW27 weekly ocean color. PGE51 also requires D4FAXMNT ancillary data files which match the eight days of input MODIS data. The eight ancillary data files matching the 8-days of PGE51 processing period will be staged without setting a delta on the start of the period. Both the time-averaged and synoptic data are matched at the beginning of the day. However, to retrieve the 1.5 hours of synoptic data for the last of the 8-day period, the next ancillary file is needed. Using the

Start and End of the processing period from date 10/01/01 to 10/08/01, the following delta and extended processing period are computed:

$S = 01 \text{ day } 00 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$

$E = 08 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$

$S_{del} = (0 * 24 \text{ hours}) = 00 \text{ hr}$

$S_{new} = 01 \text{ day } 00 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$

$E_{del} = (0 * 24 \text{ hours}) + 01 \text{ hr } 30 \text{ min} = 01 \text{ hr } 30 \text{ min}$

$E_{new} = 08 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec} + 01 \text{ hr } 30 \text{ min} = 09 \text{ day } 01 \text{ hr } 29 \text{ min } 59.99 \text{ sec}$

The extended range from S_{new} to E_{new} show that Days 1 to 9 of the D4FAXMNT are retrieved because the RangeBeginningTime of the Day 9 ancillary file falls within the window from S_{new} to E_{new} as well as the ancillary files matching Days 1 to 8 for the processing period.

5.8.4 Case 4: Input ESDT with Associated SingleDateTime and Data Centered on Synoptic Time of File

Case 4 applies to several ancillary data types, including GDAS_0ZF, SEA_ICE, OZ_DAILY, OZONEEP, and FNMOC_ML used by the MODIS PGEs and described in Table 3-4. These types of ancillary data are output from models into a single file per synoptic time. The date and time for which the file is valid is centered on the synoptic time which is stored into the SingleDateTime metadata. The range of time associated with a synoptic time is +/- half of the time interval between the current file at hour Z and the two adjacent files.

GDAS_0ZF has four files per day with the SingleDateTime at 0Z, 6Z, 12Z, and 18Z hours. The time range over which data in each file are valid is +/- 3 hours centered on the synoptic time. SEA_ICE has one file per day with the SingleDateTime at 00Z hours. The time range covered by each file is +/- 12 hours from 00Z hours each day. OZ_DAILY and OZONEEP are daily files of averaged data with the SingleDateTime at 12Z hours each day. The time range covered by these files is 00Z hours to 24Z hours each day. FNMOC_ML is a daily file with a SingleDateTime at 00Z hours. The time range covered by these files is +/- 12 hours from 00Z hours.

The algorithm for retrieval of ancillary data of these types to best match the current processing period of a MODIS PGE and include additional files on either side of the processing period is the same as the general formula. The term for the number of files outside the processing period has the same meaning. The offset interval time "i" is now half the time interval between the Z hour synoptic time and the next Z hour synoptic time. In the final term "p" is the range of time covered by a granules of required input to match the ancillary data. This term is required as an additional offset in the opposite direction from the "i" term to avoid including the SingleDateTime of unwanted outer most ancillary granules which fall very close to or exactly on the border of the extended processing period window.

The following algorithm is used for Case 4:

$$S_{del} = (n * r) + i - p/2$$

$$E_{del} = (n * r) + i - p/2$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside of processing period

r = range of time covered by input file or granule

i = half of the time interval between synoptic times of two consecutive input files

p = nominal time range of a required product granule for the PGE processing period

Example 1:

MODIS PGE06 is executed once for each of 5-minute MODIS L1B Calibrated Radiances granule and MOD03 granule. PGE06 also requires matching ancillary data file of GDAS_OZF as input. For the following start and stop times of typical production periods, the algorithm is used to retrieve the ancillary data file which best matches the MODIS data for a PGE instance with a processing period of date: 10/15/01.

$$S = 15 \text{ day } 08 \text{ hr } 55 \text{ min } 00.00 \text{ sec}$$

$$E = 15 \text{ day } 08 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$$

$$S_{del} = (0 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$$

$$E_{del} = (0 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$$

$$S_{new} = 15 \text{ day } 08 \text{ hr } 55 \text{ min } 00.00 \text{ sec} - 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec} = \\ 15 \text{ day } 05 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$$

$$E_{new} = 15 \text{ day } 08 \text{ hr } 59 \text{ min } 59.99 \text{ sec} + 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec} = \\ 15 \text{ day } 11 \text{ hr } 57 \text{ min } 29.99 \text{ sec}$$

Only the 6Z GDAS_OZF file for Day 15 has the SingleDateTime within the extended processing period window from S_{new} to E_{new} . Thus, this ancillary file is the only one retrieved for the PGE instance. This file best matches the processing period.

Example 2:

MODIS PGE11 runs once for each orbit of 5-minute MODIS L1B Calibrated Radiances granules and MOD03 granules. PGE11 also requires 2 or 3 matching ancillary data files of OZ_DAILY as input depending on the start time of the orbit. If the orbit start time is

12:00 or earlier, the OZ-DAILY for the previous day and current day are staged for the PGE run. If the end time of the orbit is 12:00 or later, the OZ_DAILY file for the day following the processing period is also staged for the PGE run. The current daily OZ_DAILY file which best matches the MODIS data is needed for the PGE run and one file on either side of the processing period of date: 10/02/01.

S = 02 day 11 hr 15 min 00.00 sec

E = 02 day 12 hr 43 min 36.00 sec

Sdel = (1 * 24 hours) + 12 hr - (98.6 min/2) = 35 hr 10 min 42.00 sec

Edel = (1 * 24 hours) + 12 hr - (98.6 min/2) = 35 hr 10 min 42.00 sec

Snew = 02 day 11 hr 15 min 00.00 sec - 35 hr 10 min 42.00 sec =
01 day 00 hr 04 min 18.00 sec

Enew = 02 day 12 hr 43 min 36.00 sec + 35 hr 10 min 42.00 sec =
03 day 23 hr 54 min 18.00 sec

The OZ_DAILY files on Days 1, 2, and 3, have their SingleDateTime at 12Z hours within the extended processing period window from Snew to Enew. Thus, these three files are retrieved for the data processing period. These files fit the criteria of the best match and one file on either side of the processing period.

5.9 Nearest Temporal Match Production Rule

A variation of the Advanced Temporal Production Rule is the Nearest Temporal Match Production Rule. This rule allows a PGE to request the closest input granule of an ESDT from the Data Processing Request time. The search is performed either forward or backward in time for a specified time period until it finds a granule that matches the request. A length for the time period of the search must be specified for the query. This rule allows a search in both directions of time for each PGE execution.

5.10 PGE and ESDT Information To Be Provided by MODIS for Level 1 PGEs to be Tested and Integrated by the ECS PDPS at SSI&T

The Science Software Development Teams must provide data processing information for each PGE to the DAAC at SSI&T. This information is entered into the PDPS Database when the PGE is registered. The information includes the Production Rules for the PGE and specific details about each of the input and output ESDTs. When the PGE is delivered to the DAAC, specific information is supplied in the form of parameters defined by ECS and values supplied by the Science Software Development Teams. These parameters are put into PGE and ESDT files in ODL at SSI&T for use by the PDPS. The Science Teams need only to supply the information in the form of a list of values for the required ECS parameters. For PGEs which require multiple profiles to produce different outputs, at least one of the parameter values will change. Thus, the PGE must be registered for each profile. The DAAC also extracts information for the PGE and ESDT ODL files from the PCF by use of an automated SSI&T tool. Some of

the parameters contained in the PCF are repeated here as an aid to correlating file names in the SCF PCFs with ESDTs and other information.

The lists in the following sections contain generic parameter names with a description of the information required for MODIS PGEs and items specifying information about the Production Rules for the PGE which will assist the MODIS SDST in preparing documentation to be delivered with the PGEs. An ESDT ODL Parameter section must be supplied for each of the ESDTs which appear in the PCF. Lists of parameters must also be supplied for each runtime parameter. Each of these entities is identified by a Logical ID and a PCF file type. The valid PCF file types are identified by the following integers:

- 1 Product Input Files
- 2 Product Output Files
- 3 Support Input Files
- 4 Support Output Files
- 5 User Defined Runtime Parameters
- 6 Interim/Intermediate Input Files
- 7 Interim/Intermediate Output Files
- 8 Temporary Input/Output Files

MODIS plans to use only the Product Input Files, Product Output Files, User Defined Runtime Parameters, Interim/Intermediate Input Files, and Interim/Intermediate Output Files.

5.10.1 PGE ODL Parameters

The following are the parameters for PGE ODL:

- PGE_NAME = MODIS team's name for the PGE, identifying the instrument as MODIS (string of maximum length 12); such as "MODIS_PGE16".
- PGE_VERSION = MODIS Team's version of the PGE (string of maximum length 5); such as "2.1"; will increment if a new static granule is supplied or a static runtime parameter is modified.
- PGE_SSW_VERSION = MODIS Team's version of the Science Software (string of maximum length 5); may be the same as the PGE_VERSION such as "2.1"; will increment if the PGE software is changed and rebuilt.
- PLATFORM = Spacecraft platform name; value for MODIS AM-1 launch = "AM-1".
- INSTRUMENT = Instrument name; value for MODIS = "MODIS".
- PROFILE_ID = A number used to identify the PGE profile (integer value).
- PROFILE_DESCRIPTION = A brief description of the profile (string of maximum length 255).
- MINIMUM_OUTPUTS = Minimum number of outputs acceptable for QA of products from one execution of the PGE (maximum 3 digits); typical values range from 0 to 2.
- SCHEDULE_TYPE = Type of Scheduling for the PGE required for top level Production Rule for executing the PGE. PGEs using the tiling production rules

always have the type of scheduling set to “Tile” even though they are also executed for a specific time period. Validates for each Production Rule:

- Basic Temporal = “Time”
- Period (Calendar) Specification = “Time”
- Period Start_of_N_Days Specification = “Time”
- Orbit-Based = “Orbit”
- Latitude/Longitude Tiling = “Tile”
- Zonal Tiling = “Tile”
- PROCESSING PERIOD = Nominal time interval between start of PGE runs:
(Valid: SECS, MINS, HOURS, DAYS, WEEKS, THIRDS, MONTHS, YEARS, ORBITS)
Examples: “DAYS=1”, “MINS=5”
- PROCESSING BOUNDARY = Nominal time boundary on which PGE processing is scheduled:
(Valid: START_OF_HOUR, START_OF_6HOUR, START_OF_DAY, START_OF_WEEK, START_OF_ONE_THIRD_MONTH, START_OF_MONTH, START_OF_YEAR, START_DATE, START_OF_ORBIT)
- EXIT_CODE = The exit code for the PGE (Valid Range: 0 or 200-239, 0=MODIS PGE completed successfully).
- EXIT_MESSAGE = Message corresponding to the EXIT_CODE (string of maximum length 240); Instrument Teams only provide messages for customized codes which they define (Valid Range: 203-222, all others are system defined).

The following are the parameters for PGEs requiring the Latitude/Longitude Tiling Production Rule:

- 6 QUERY_DELAY = Number of seconds after the end of the processing period to delay before starting the query for input products.
- 7 TILE_SCHEME_NAME = The name given to the tile scheme by the MODIS Team when the Tile Definition is registered.

5.10.2 ESDT ODL Parameters for Product Output Files

- DATA_TYPE_NAME = ESDT ShortName for the product.
- DATA_TYPE_VERSION = ESDT output product version (maximum length 5 characters).
- DATA_TYPE_DESCRIPTION = MODIS team’s brief description of the ESDT data collection. Suggested value: ESDT LongName (maximum length 60 characters).
- PCF_FILE_TYPE = Integer by which PDPS recognizes the type of file (Valid for product output file = 2).
- HDF_DATA = Is the product in HDF format (Valid: “Y”, “N”)?
- LOGICAL_ID = Logical unit number for the product (in PCF).
- ASSOCIATED_MCF_ID = Logical unit number for the product’s MCF (in PCF).

- MAX_GRANULE_YIELD = Maximum number of output file instances expected (automatically extracted from PCF).
- MIN_GRANULE_YIELD = Minimum number of granules to be output for PGE run to be considered as successful; may be 0 if granules are not always expected.
- SCIENCE_GROUP = Classification of product output [Valid: ("S"-Science file, "Q"-QA File, "H"-Production History file, "B"-Browse file), and (Number of file within the group - Valid Range: 1-999) Example: "S1"]
- NOMINAL_SIZE = Nominal file size in MB for this product (integer value).
- MINIMUM_SIZE = Minimum (approximate) file size in MB for this product (integer value).
- MAXIMUM_SIZE = Maximum (approximate) file size in MB for this product (integer value).
- FILETYPE_NAME = Brief description of type of data stored in the file (maximum length 20 characters). If a granule contains more than one file, this information should be included here. Examples: "Instrument Band 7", "Multifile Granule".
- INSTANCE = Nominal number of file instances with different Logical IDs, but these files are associated with each other. INSTANCE is set to 0 if this parameter is to be ignored (Default: 0).

5.10.3 ESDT ODL Parameters for Product Input Files

- DATA_TYPE_NAME = ESDT ShortName for the input product.
- DATA_TYPE_VERSION = ESDT input product version (maximum length 5 characters).
- DATA_TYPE_DESCRIPTION = MODIS team's brief description of the ESDT data collection. Suggested value: ESDT LongName (maximum length 60 characters).
- PCF_FILE_TYPE = Integer by which PDPS recognizes the type of file (Valid: for product input files = 1).
- LOGICAL_ID = Logical unit number for the input product (in PCF).
- DATA_TYPE_REQUIREMENT = Nominal number of input file instances for this logical unit number (in PCF).
- INPUT TYPE = Type of input file (Valid: Required, Optional, Primary, Alternate)
- FILETYPE_NAME = Brief description of type of data stored in the file (maximum length 20 characters). If a granule contains more than one file, this information should be included here. Examples: "Instrument Band 7", "L0 Multifile Granule".
- QUERY_TYPE = Method by which data are retrieved and staged for input (Valid: "Temporal", "Spatial", "Tile", "Already Created Tile", Default: "Temporal")
- MAX_GRANULES_REQUIRED = Maximum number of input granules for this ESDT. Value can be obtained from the PCF.

To run the PGE without a full set of Required inputs or without the Optional inputs:

- CATEGORY = Name for grouping inputs (string of maximum length 40).

- MIN_GRANULES_REQUIRED = Minimum Number of Granules of this ESDT required to be available before the PGE is executed (N/A to Optional). For PGEs using the Latitude/Longitude Tiling Production Rule, this parameter should be set to one.
- TIMER = Wait time for Minimum Number of Granules of required input to be available or for execution or wait time for execution without Optional inputs (Valid: MONTHS, WEEKS, DAYS, HOURS, MINS, SECS)

Examples: "DAYS=1", "MINS=2"

- TEMPORAL = Temporal flag indicating if the optional file should be the previous version of the data product (Valid: "Y" or "N").

If the Alternate Inputs Production Rule is required:

- CATEGORY = Name of the Alternate Category (string of maximum length 40).
- ORDER = Order of preference for alternates (Primary must have Order = 1; others have order = 2...n).
- TIMER = Wait time for this Alternate Input to be available before the countdown for the next Alternate begins (Valid: MONTHS, WEEKS, DAYS, HOURS, MINS, SECS).

Examples: "DAYS=1", "MINS=2"

- WAIT_FOR = Wait For flag which informs PDPS to wait for the alternate input regardless of the timer value (Valid: "Y" or "N"; MODIS Default: "N").
- TEMPORAL = Temporal flag indicating whether the alternate should be previous version of the data product rather than the most current version (Valid: "Y" or "N").
- MIN_GRANULES_REQUIRED = Minimum Number of Granules of this ESDT required to be available on time-out before the countdown for the next Alternate begins.
- RUNTIME_PARM_ID = Runtime Parameter Logical ID to hold the Logical ID of the alternate input or optional input. A corresponding Runtime Parameter must be defined in the PCF. Since a value for this parameter is required by PDPS, MODIS will use a flag value of 999999 to indicate that this parameter is not used (Valid Range: 1-9999, 11000-999999)

If the type is primary, the following parameter is also needed:

- NUMBER_NEEDED = Number of Alternate Inputs needed (Valid: 0, 1); at most, one alternate may be used.

If the Advanced Temporal Production Rule is required:

- BEGIN_PERIOD_OFFSET = Delta time to be applied to start of processing period (+ moves date/time forward, - moves date/time backward, 0 is default).
- END_PERIOD_OFFSET = Delta time to be applied to end of processing period (+ moves date/time forward, - moves date/time backward, 0 is default).

If the input file is a static file, the following parameter is also needed:

- SCIENCE_GROUP = Type of Static file [Valid: ("C" - Coefficient file, "L" - Lookup file, "D" - Database file, "O" - Other type file) and (number of file within the group - Valid Range: 1-999) Example "C1"].

5.10.4 ESDT ODL Parameters for Interim/Intermediate Files

For Interim/Intermediate type of files the following additional information needs to be supplied:

- DATA_TYPE_NAME = ESDT ShortName for the product.
- DATA_TYPE_VERSION = ESDT output product version (maximum length 5 characters).
- INTERIM SHORT DURATION = Minimum time the granules are to be kept before being deleted when they are no longer needed.
- INTERIM LONG DURATION = Longest time that granules must be kept for possible future use before being deleted.
- INTERIM LAST PGE TO USE = Parameter that defines if this PGE is the last to use this Interim data type (Valid: "Y" or "N").

5.10.5 ESDT ODL Parameters for Metadata-Based Activation

Metadata_Checks are performed on the Inventory metadata attributes or PSAs in granules of a particular ESDT. If the resulting value matches the metadata check value, the PGE is activated. If not, the PGE is not activated.

- PARM_NAME = Name of metadata parameter or attribute on which this execution of the PGE depends (maximum length 40 characters).
- OPERATOR = Operator for the query dependency condition (Valid: >, <, >=, <=, ==, !=).
- VALUE = Value for parameter or attribute in the ESDT upon which the PGE activation or inclusion of granules in the PGE run depends.

This value may be overridden by specifying a query to be performed on a parameter in the PDPS Database rather than the value above.

- DATABASE_QUERY = PDPS Database parameter (Valid: NONE, TILE ID, ORBIT NUMBER, PATH NUMBER, DATA DAY).

5.10.6 ESDT ODL Parameters for Metadata-Based Query

A Metadata-Based Query is performed on the Inventory metadata attributes or PSAs in granules of a particular ESDT to select granules which meet the query criteria. The parameters in this section are included in the Product Input File list for the ESDT which contains the parameters or attributes to be used in the query for selecting granules for the PGE execution.

- PARM_NAME = Name of metadata parameter or attribute on which this execution of the PGE depends (maximum length 40 characters).
- OPERATOR = Operator for the query dependency condition (Valid: >, <, >=, <=, ==, !=).

- **VALUE** = Value for parameter or attribute in the ESDT upon which the PGE activation or inclusion of granules in the PGE run depends.

This value may be overridden by specifying a query to be performed on a parameter in the PDPS Database rather than the value above.

- **DATABASE_QUERY** = PDPS Database parameter (Valid: NONE, TILE ID, ORBIT NUMBER, PATH NUMBER, DATA DAY).

5.10.7 ESDT ODL Parameters for Runtime Parameters

The Runtime parameters to be used in the Production Rule must be included in the PCF for the PGE. If the Runtime parameter is not to be changed, the information from the PCF is automatically put into the PGE ODL file and then into the PDPS Database by SSI&T software. Overrides of Runtime Parameters occur when Production Requests are entered. The information for a dynamic insert of a value for a Runtime Parameter when the PGE is executed must be supplied to the DAAC. The use of the Tiling and Data Day Production Rules enable the PDPS to automatically insert values of runtime parameters. For special processing requests, the operator may override the values in the Runtime Parameters when the production request is created.

- **LOGICAL_ID** = Logical unit number for the Runtime Parameter (in PCF).
- **PGE_PARAMETER_NAME** = Name of the Runtime Parameter for which the value is to be inserted at the PGE execution.
- **PGE_PARAMETER_DEFAULT** = User deferred default value for the PGE.
- **PGE_PARAMETER_DYNAMIC_VALUE** = Value to be inserted by PDPS (Valid: needed by MODIS: "TILE ID", "ORBIT NUMBER", "DATA DAY", "NONE"); (maximum length 200 characters).

For each of these values, the PDPS is to take the following action:

- **TILE ID** - Retrieve the ID of the tile.
- **ORBIT NUMBER** - Retrieve the number of the orbit.
- **DATA DAY** - Retrieve the data day.
- **NONE** - No dynamic value, use default.

6. SYSTEM PERFORMANCE

6.1 *Performance Factors*

Nominal system performance can be evaluated based upon whether the planned product processing is being carried out on schedule and all the required products are produced. Measurements of the performance of the MODIS Science Data Processing System include the utilization of available system resources, the rates at which the Level 1 input data can be ingested, the rates at which the input data can be processed into higher level products, and the rates at which the higher level products can be exported. Errors in processing are reported to the SMF log files. The system monitoring utilities should indicate that the PGE completed normally or abnormally. Only under abnormal conditions should operator intervention be required to resolve problems.

In previous versions of the MODIS System Description document the MODIS product volume tables were not included because of frequent deliveries of new PGEs, rapid changes in existing PGEs, frequent additions of new products, changes in product file sizes, and changes in amounts of each product type to be made. After over a year of processing of Aqua data and several years of reprocessing of Terra data, the disk space volumes required for each ESDT product are relatively stable and a representative sample of the MODIS product volume tables have been included in the current document. System loads are highly correlated with the type of computers, file servers, storage facilities, and other hardware available at any time. For this reason MODIS data processing load tables are not included in the document.

6.2 *Resource Utilization*

The resource requirements for the MODIS PGEs are maintained in MODIS Product Volumes and Loads Estimate databases. This information is provided to ECS and the GSFC DAAC as part of the Level 1 software deliveries and to ECS, the DAACs, and other groups as requested. The representative tables included in this document only contain information related to the MODIS product volumes. Table 6-1 shows the MODIS products and volumes at the GSFC DAAC. Table 6-2 shows the MODIS Atmosphere products and volumes at MODAPS. Table 6-3 shows the MODIS Land products and volumes at MODAPS. Table 6-4 shows the MODIS Oceans products and volumes at MODAPS. The exported and non-exported products are shown in separate tables in the System Operations section, but without the associated volumes.

The columns in these tables contain the following information:

1. MODIS ESDT ShortName.
2. MODIS ESDT LongName or Collection Description.
3. Name of PGE that generates the product.
4. Processing Level.
5. Data Processing Center.

6. Data Archive Center (A value of N/A indicates that the product is not exported to one of the DAACs).
7. File size in MB.
8. Number of files of the ESDT product generated per processing period.
9. Volume of the ESDT product in GB generated per processing period.

The tables also contain the total of the number of files produced by the PGE for each processing period and the total of the volume in GB generated by the PGE for each processing period. Only the Terra ESDT names are shown in the tables. The Aqua ShortNames have the "MO" in Terra replaced by "MY". If there is a Combined Terra plus Aqua product, the ShortNames have the "MO" replaced by "MC". At this time the volumes for the Aqua and Combined Terra plus Aqua products are assumed to be the same as the Terra volumes.

Table 6-1. MODIS Level 1 ESDT Products and Volumes

Notes: 1. Terra and Aqua Products have the same volumes. ShortNames for Aqua Products have "MO" in Terra replaced by "MY" in Aqua.

2. If the difference between the size of Day and Night Mode data is large, an ESDT has two rows. The first is Day Mode and second is Night Mode data.

3. PGE02 makes MOD021KM for Day, Night, and Both Modes; MOD02HKM and MOD02QKM for Day and Both Modes to give an average of 164 files/day.

4. Processing period for Level 1 and Level 2 products is one day.

Data_Type ShortName	Collection Description	PGE	Level	Data Processing Center	Data Archive Center	File Size (MB)	Number of Files per Processing Period	Volume (GB/ processing- period)
MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	PGE01	1	GDAAC	GDAAC	548	144	78.912
MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	PGE01	1	GDAAC	GDAAC	181	144	26.064
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km	PGE01	1	GDAAC	GDAAC	60.4	288	17.3952
					Total/PGE		576	122.3712
MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	PGE02	1	GDAAC	GDAAC	343.6	144	49.4784
MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	PGE02	1	GDAAC	GDAAC	142.7	144	20.5488
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m	PGE02	1	GDAAC	GDAAC	275.2	164	45.1328
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m	PGE02	1	GDAAC	GDAAC	285.6	164	46.8384
MOD02OBC	MODIS/Terra On-Board Calibrator and Engineering Data 5-Min L1B	PGE02	1	GDAAC	GDAAC	59	288	16.992
MOD021QA	MODIS/Terra QA Summary of Calibrated Radiances 5-Min L1B 1km	PGE02	1	GDAAC	GDAAC	0.0505 68	288	0.014563584
					Total/PGE		1192	179.0049636
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km	PGE03	2	GDAAC	GDAAC	32.3	288	9.3024
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	PGE03	2	GDAAC	GDAAC	47.5	288	13.68
MODVOLC	MODIS/Terra Volcano Alert 5-Min L2	PGE03	2	GDAAC	GDAAC	0.151	288	0.043488
MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics Index 25km Global Grid 5-Min L2 Swath	PGE03	2	GDAAC	GDAAC	1.1	288	0.3168
MOD07_QC	MODIS/Terra Vertical Profiles Diagnostics 5-Min L2 5km	PGE03	2	GDAAC	GDAAC	1	288	0.288
MOD35_QC	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km	PGE03	2	GDAAC	GDAAC	1	288	0.288

					Total/PGE		1728	23.918688
MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath	PGE71	1	GDAAC	GDAAC	142	144	20.448
MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath	PGE71	1	GDAAC	GDAAC	48	144	6.912
					Total/PGE		288	27.36

Table 6-2. MODIS Atmosphere ESDT Products and Volumes

Notes: 1. Terra and Aqua Products have the same volumes. ShortNames for Aqua Products have "MO" in Terra replaced by "MY" in Aqua.

2. The MODIS Products generated at the GSFC DAAC are included in a second table because the first Atmosphere PGE runs at the GSFC DAAC.

3. Processing period for Level 2 products is one day.

Data_Type ShortName	Collection Description	PGE	Level	Data Processing Center	Data Archive Center	File Size (MB)	Number of Files per Processing Period	Volume (GB/ processing- period)
MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km	PGE04	2	MODAPS	GDAAC	10.5	144	1.512
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km	PGE04	2	MODAPS	GDAAC	12.7	288	3.6576
MOD04_QC	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2	PGE04	2	MODAPS	N/A	1	144	0.144
MOD05_QC	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2	PGE04	2	MODAPS	N/A	1	288	0.288
					Total/PGE		864	5.6016
MODATML2	MODIS/Terra Aerosol Cloud Water Vapor Subset 5-Min L2 Swath 5km and 10km	PGE83	2	MODAPS	GDAAC	2.2	288	0.6336
					Total/PGE		288	0.6336
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km	PGE06	2	MODAPS	GDAAC	44.7	288	12.8736
MOD6CTQC	MODIS/Terra MOD_PR06CT QC File for Cloud Top Algorithm 5-Min L2	PGE06	2	MODAPS	N/A	1	288	0.288
MOD6CDQC	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2	PGE06	2	MODAPS	N/A	1	288	0.288
MOD6ODQ C	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2	PGE06	2	MODAPS	N/A	1	288	0.288
MOD6ANCT	MODIS/Terra Cloud Product Temporary File in HDF Format 5-Min L2	PGE06	2	MODAPS	N/A	1	288	0.288
					Total/PGE		1440	14.0256
MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG	PGE69	3	MODAPS	N/A	12	36	0.432

MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling High Resolution Daily L3 Global 0.1Deg CMG	PGE69	3	MODAPS	N/A	34	36	1.224
					Total/PGE		72	1.656
MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG	PGE56	3	MODAPS	GDAAC	402	1	0.402
MOD08D3H	MODIS/Terra Joint Aerosol/Water Vapor/Cloud Daily L3 Global 0.1Deg CMG	PGE56	3	MODAPS	N/A	1300	1	1.3
					Total/PGE		2	1.702
MOD08_E3	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG	PGE70	3	MODAPS	GDAAC	782	1	0.782
					Total/PGE		1	0.782
MOD08_M3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG	PGE57	3	MODAPS	GDAAC	782	1	0.782
					Total/PGE		1	0.782

Table 6-3. MODIS Land ESDT Products and Volumes

Notes: 1. Terra, Aqua, and Combined Terra + Aqua Products have the same volumes. ShortNames have "MO" in Terra replaced by "MY" in Aqua and "MC" in Combined.

2. Processing period for Level 2 products is one day.

Data_Type ShortName	Collection Description	PGE	Level	Data Processing Center	Data Archive Center	File Size (MB)	Number of Files per Processing Period	Volume (GB/ processin g-period)
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m	PGE07	2	MODAPS	NDAAC	21.4	164	3.5096
MOD10L2C	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km	PGE07	2	MODAPS	N/A	1.1	164	0.1804
					Total/PGE		328	3.69
MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km	PGE08	2	MODAPS	NDAAC	15.6	180	2.808
MOD29L2C	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km	PGE08	2	MODAPS	N/A	1.7	180	0.306
					Total/PGE		360	3.114
MOD09	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km	PGE11	2	MODAPS	N/A	424	164	69.536
MOD02CRS	MODIS/Terra Coarse calibrated Radiances 5-Min L2 Swath 5km	PGE11	2	MODAPS	N/A	8.5	288	2.448
MOD02CSS	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-Min L2 Swath 5km	PGE11	2	MODAPS	N/A	8	288	2.304
MOD09CRS	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km	PGE11	2	MODAPS	N/A	3	288	0.864
MOD09IDN	MODIS/Terra Interim Surface Reflectance North Polar Region 1-Orbit L3 5km CMG	PGE11	3	MODAPS	N/A	134	14.6	1.9564
MOD09IDS	MODIS/Terra Interim Surface Reflectance South Polar Region 1-Orbit L3 5km CMG	PGE11	3	MODAPS	N/A	134	14.6	1.9564
MOD09IDT	MODIS/Terra Interim Surface Reflectance Non-Polar Region 1-Orbit L3 5km CMG	PGE11	3	MODAPS	N/A	134	14.6	1.9564
					Total/PGE		1071.8	81.0212
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	PGE30	2	MODAPS	EDAAC	13.8	288	3.9744
MOD14CRS	MODIS/Terra Coarse Thermal Anomalies/Fire 5-min L2 Swath 5km	PGE30	2	MODAPS	N/A	1	288	0.288
					Total/PGE		576	4.2624
MOD03CP	MODIS/Terra Geolocation Control Point Residuals 5-Min L2 50m	PGE60	2	MODAPS	N/A	0.015	288	0.00432
					Total/PGE		288	0.00432
MOD11_L2	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	PGE16	2	MODAPS	EDAAC	25.9	288	7.4592

MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid	PGE16	3	MODAPS	EDAAC	23.9	317	7.5763
MOD11B1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km SIN Grid	PGE16	3	MODAPS	EDAAC	2	317	0.634
MOD11UPD	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km SIN Grid	PGE16	3	MODAPS	N/A	39	317	12.363
					Total/PGE		1239	28.0325
MODMGGAN	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Night	PGE12	2G	MODAPS	N/A	37.1	294	10.9074
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night	PGE12	2G	MODAPS	N/A	25	294	7.35
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day	PGE12	2G	MODAPS	N/A	150	210	31.5
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night	PGE12	2G	MODAPS	N/A	150	210	31.5
MODMGPGD	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day	PGE12	2G	MODAPS	N/A	70	210	14.7
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day	PGE12	2G	MODAPS	EDAAC	30.9	294	9.0846
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day	PGE12	2G	MODAPS	EDAAC	22.8	294	6.7032
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid	PGE12	2G	MODAPS	EDAAC	110.8	294	32.5752
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid	PGE12	2G	MODAPS	EDAAC	355.4	294	104.4876
					Total/PGE		2394	248.808
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid	PGE13	2G	MODAPS	EDAAC	256.1	294	75.2934
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid	PGE13	2G	MODAPS	EDAAC	176.3	294	51.8322
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid	PGE13	2G	MODAPS	EDAAC	6.3	294	1.8522
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day	PGE13	2G	MODAPS	N/A	50.7	294	14.9058
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night	PGE13	2G	MODAPS	N/A	50.7	294	14.9058
					Total/PGE		1470	158.7894
MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid	PGE14	2G	MODAPS	N/A	31	317	9.827
					Total/PGE		317	9.827
MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid	PGE15	2G	MODAPS	N/A	70	210	14.7

	Day							
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night	PGE15	2G	MODAPS	N/A	70	210	14.7
					Total/PGE		420	29.4
MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid	PGE22	3	MODAPS	N/A	166.3	294	48.8922
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km SIN Grid	PGE22	3	MODAPS	N/A	4.1	294	1.2054
					Total/PGE		588	50.0976
MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid	PGE33	4	MODAPS	N/A	28	286	8.008
MOD15A1C	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global SIN Grid	PGE33	4	MODAPS	N/A	0.3	286	0.0858
					Total/PGE		572	8.0938
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid	PGE36	4	MODAPS	N/A	28	286	8.008
					Total/PGE		286	8.008
MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid	PGE43	3	MODAPS	NDAAC	10.8	317	3.4236
					Total/PGE		317	3.4236
MODHDFSR	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 500m SIN Grid	PGE80	3	MODAPS	N/A	127	18	2.286
MODQDFSR	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 250m SIN Grid	PGE80	3	MODAPS	N/A	277	18	4.986
					Total/PGE		36	7.272
MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	PGE44	3	MODAPS	NDAAC	6	210	1.26
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	PGE44	3	MODAPS	NDAAC	3.4	210	0.714
					Total/PGE		420	1.974
MOD29E1D	MODIS/Terra Sea Ice Extent and IST Daily L3 Global 4km EASE-Grid Day	PGE84	3	MODAPS	NDAAC	112	1	0.112
					Total/PGE		1	0.112
MOD10C1	MODIS/Terra Snow Cover Daily L3 Global 0.05Deg CMG	PGE46	3	MODAPS	NDAAC	8	1	0.008
					Total/PGE		1	0.008
MOD09CMG	MODIS/Terra Surface Reflectance Daily L3 Global 0.05Deg CMG	PGE75	3	MODAPS	EDAAC	766	1	0.766
					Total/PGE		1	0.766
MOD11C1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 0.05Deg CMG	PGE32	3	MODAPS	EDAAC	17	1	0.017

					Total/PGE			0.017
MOD09A1	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid	PGE21	3	MODAPS	EDAAC	161.5	294	47.481
MOD09Q1	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid	PGE21	3	MODAPS	EDAAC	138.5	294	40.719
MOD09A1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km SIN Grid	PGE21	3	MODAPS	N/A	1	294	0.294
					Total/PGE		882	88.494
MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid	PGE29	3	MODAPS	EDAAC	57.7	286	16.5022
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid	PGE29	3	MODAPS	EDAAC	3	286	0.858
MOD14A1C	MODIS/Terra Coarse Thermal Anomalies/Fire Daily L3 Global 5km SIN Grid	PGE29	3	MODAPS	N/A	2.4	286	0.6864
MOD14A2C	MODIS/Terra Coarse Thermal Anomalies/Fire 8-Day L3 Global 5km SIN Grid	PGE29	3	MODAPS	N/A	0.15	286	0.0429
					Total/PGE		1144	18.0895
MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km SIN Grid	PGE31	3	MODAPS	EDAAC	23.3	317	7.3861
					Total/PGE		317	7.3861
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid	PGE34	4	MODAPS	EDAAC	5.8	286	1.6588
MOD15A2C	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 5km SIN Grid	PGE34	4	MODAPS	N/A	0.3	286	0.0858
					Total/PGE		572	1.7446
MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid	PGE37	4	MODAPS	EDAAC	4.1	286	1.1726
MOD17A2C	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km SIN Grid	PGE37	4	MODAPS	N/A	0.236	286	0.067496
					Total/PGE		572	1.240096
MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid	PGE45	3	MODAPS	NDAAC	10.8	317	3.4236
					Total/PGE		317	3.4236
MOD10C2	MODIS/Terra Snow Cover 8-Day L3 Global 0.05Deg CMG	PGE67	3	MODAPS	NDAAC	104	1	0.104
					Total/PGE		1	0.104
MOD11C2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 0.05Deg CMG	PGE58	3	MODAPS	EDAAC	17	1	0.017
					Total/PGE		1	0.017
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid	PGE23	3	MODAPS	EDAAC	112.4	294	33.0456

MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid	PGE23	3	MODAPS	EDAAC	141.2	294	41.5128
MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid	PGE23	3	MODAPS	EDAAC	69.2	294	20.3448
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid	PGE23	3	MODAPS	EDAAC	31.8	294	9.3492
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km SIN Grid	PGE23	3	MODAPS	N/A	4.5	294	1.323
MOD43B2C	MODIS/Terra Coarse BRDF/Albedo Model-2 16-Day L3 Global 5km SIN Grid	PGE23	3	MODAPS	N/A	4.5	294	
MOD43B3C	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km SIN Grid	PGE23	3	MODAPS	N/A	2.8	294	0.8232
MOD43B4C	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km SIN Grid	PGE23	3	MODAPS	N/A	1.3	294	0.3822
					Total/PGE		2352	106.7808
MOD13A1	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m SIN Grid	PGE25	3	MODAPS	EDAAC	126.9	294	37.3086
MOD13Q1	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid	PGE25	3	MODAPS	EDAAC	507.1	294	149.0874
					Total/PGE		588	186.396
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid	PGE35	3	MODAPS	EDAAC	31.8	294	9.3492
MOD13A2C	MODIS/Terra Coarse Vegetation Indices 16-Day L3 Global 5km SIN Grid	PGE35	3	MODAPS	N/A	1.4	294	0.4116
					Total/PGE		588	9.7608
MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 250m SIN Grid	PGE72	3	MODAPS	N/A	368.8	286	105.4768
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 500m SIN Grid	PGE72	3	MODAPS	N/A	276.6	286	79.1076
MOD44CT	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L4 Global	PGE72	3	MODAPS	N/A	0.034	286	0.009724
					Total/PGE		858	184.5941
MOD13C1	MODIS/Terra Vegetation Indices 16-Day L3 Global 0.05Deg CMG	PGE27	3	MODAPS	EDAAC	725	1	0.725
					Total/PGE		1	0.725
MOD43C1	MODIS/Terra Albedo 16-Day L3 Global 0.05Deg CMG	PGE24	3	MODAPS	EDAAC	45.7	1	0.0457
					Total/PGE		1	0.0457
MOD43C2	MODIS/Terra BRDF/Albedo Parameters 16-Day L3 Global 0.05Deg CMG	PGE65	3	MODAPS	EDAAC	66.5	1	0.0665
					Total/PGE		1	0.0665
MOD43C3	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 0.05Deg CMG	PGE82	3	MODAPS	EDAAC	467	1	0.467

					Total/PGE		1	0.467
MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km SIN Grid	PGE26	3	MODAPS	EDAAC	277	294	81.438
					Total/PGE		294	81.438
MOD11C3	MODIS/Terra Land Surface Temperature/Emissivity Monthly L3 Global 0.05Deg CMG	PGE59	3	MODAPS	EDAAC	17	1	0.017
					Total/PGE		1	0.017
MOD12M	MODIS/Terra Land Cover Database 32-Day L3 Global 1km SIN Grid	PGE40	3	MODAPS	N/A	109.6	286	31.3456
					Total/PGE		286	31.3456
MOD44A	MODIS/Terra Vegetation Cover Conversion 32-Day L3 Global 250m SIN Grid	PGE66	3	MODAPS	EDAAC	922	294	271.068
					Total/PGE		294	271.068
MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km SIN Grid	PGE38	4	MODAPS	EDAAC	4	286	1.144
					Total/PGE		286	1.144
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid	PGE41	3	MODAPS	EDAAC	23.2	317	7.3544
MOD12Q1C	MODIS/Terra Coarse Land Cover Type Yearly L3 Global 5km SIN Grid	PGE41	3	MODAPS	N/A	0.3	317	0.0951
					Total/PGE		634	7.4495
MOD12C1	MODIS/Terra Land Cover Type Yearly L3 Global 0.05Deg CMG	PGE42	3	MODAPS	EDAAC	39.51	1	0.03951
					Total/PGE		1	0.03951

Table 6-4. MODIS Oceans ESDT Products and Volumes

MODIS Oceans Archived and Interim Products Produced by MODAPS and Associated Volumes

Notes: 1. nn = one of parameters 1-36; mm = one of parameters D1, D2, N1, N2; ## = one of parameters 41-61, 63-66, 69-78;

D2 is produced by PGE10 but is not archived; only 39 parameters pass downstream.

2. pp = one of parameters 1-36, D1, N1, N2; qq = one of parameters 51-61, 63-66; rr = one of parameters D1-D9, DA, N1-N9, NA.

3. xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2; yy = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2;

zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC

4. Terra, Aqua, and Combined Products have the same volumes. ShortNames have "MO" in Terra replaced by "MY" for Aqua and "MC" for Combined.

5. Number of space-binned Oceans granules produced by PGE09 and PGE10 depends on many factors and can vary from day to day.

6. Number of Ocean Color space-binned files is computed as average of 172 (Day & Both Mode) files times 36 Ocean parameters or 15 QC parameters.

7. Number of SST space-binned files is computed as 288 (Day, Night & Both Mode) files times 3 SST parameters or 20 QC parameters.

8. Processing period for Level 1 and Level 2 products is one day.

Data_Type ShortName	Collection Description	PGE	Level	Data Processing Center	Data Archive Center	File Size (MB)	Number of Files per Processing Period	Volume Produced (GB/ processing- period)
AM1EPHH	MODIS/Terra Current Day Predicted Ephemeris Daily	PGE76	3	MODAPS	N/A	5.4	1	0.0054
AM1EPHH1	MODIS/Terra Predicted Ephemeris 1 Daily	PGE76	3	MODAPS	N/A	5.4	1	0.0054
AM1EPHH2	MODIS/Terra Predicted Ephemeris 2 Daily	PGE76	3	MODAPS	N/A	5.4	1	0.0054
AM1EPHH3	MODIS/Terra Predicted Ephemeris 3 Daily	PGE76	3	MODAPS	N/A	5.4	1	0.0054
					Total/PGE		4	0.0216
MODOCNMC	MODIS Preprocessed NMC Ancillary Data for Oceans Processes 6-Hr L3 Global 1Deg	PGE17	2	MODAPS	GDAAC	1.3	4	0.0052
					Total/PGE		4	0.0052
MODOCREY	MODIS Preprocessed Reynolds Sea Surface Temperature Data Oceans Weekly L3 Global 1 Deg	PGE18	2	MODAPS	GDAAC	0.305	1	0.000305

					Total/PGE		1	0.000305
MODOCOZN	MODIS Preprocessed TOMS Ozone Data for Oceans Processes Daily L3 Global 1x1.25Deg	PGE19	2	MODAPS	GDAAC	0.115	1	0.000115
					Total/PGE		1	0.000115
MODOCL2	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day	PGE09	2	MODAPS	GDAAC	88	165	14.52
MODOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day	PGE09	2	MODAPS	GDAAC	102	165	16.83
MODOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day	PGE09	2	MODAPS	GDAAC	83	165	13.695
MODOCQC	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	PGE09	2	MODAPS	GDAAC	99	165	16.335
MODOCBnn	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 4km ISEAG	PGE09	3	MODAPS	N/A	6.4	6192	39.6288
MODOQBqq	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 4km ISEAG	PGE09	3	MODAPS	N/A	7.4	2580	19.092
MOCOCL2	MODIS/Terra Ocean Color Radiance Products Site Cutouts L2 1km	PGE09	2	MODAPS	N/A	4.3	96	0.4128
MOCOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 Site Cutouts L2 1km	PGE09	2	MODAPS	N/A	4.9	96	0.4704
MOCOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 Site Cutouts L2 1km	PGE09	2	MODAPS	N/A	4	96	0.384
MOCOCQC	MODIS/Terra Ocean Color QC Products Site Cutouts L2 1km	PGE09	2	MODAPS	N/A	4.3	96	0.4128
					Total/PGE		9816	121.7808
MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km	PGE10	2	MODAPS	GDAAC	33	288	9.504
MOD28QC	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km	PGE10	2	MODAPS	GDAAC	69	288	19.872
MOD28Bmm	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 5-Min L3 Global 4km ISEAG	PGE10	3	MODAPS	N/A	7.4	864	6.3936
MODSQBrr	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Product 5-Min L3 Global 4km ISEAG	PGE10	3	MODAPS	N/A	7.4	5760	42.624
MOC28L2	MODIS/Terra Ocean Sea Surface Temperature Products Site Cutouts L2 1km	PGE10	2	MODAPS	N/A	2.3	189	0.4347

MOC28QC	MODIS/Terra Sea Surface Temperature QC Products Site Cutouts L2 1km	PGE10	2	MODAPS	N/A	3.8	189	0.7182
					Total/PGE		7578	79.5465
MOC021KM	MODIS/Terra Calibrated Radiances Site Cutouts L1B 1km	PGE79	2	MODAPS	N/A	12.8	189	2.4192
					Total/PGE		189	2.4192
MO04MA##	MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	67.2	35	2.352
MO36MA##	MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	N/A	1.1	35	0.0385
MODOQAqq	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG	PGE20	3	MODAPS	GDAAC	640	15	9.6
MODSQArr	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG	PGE20	3	MODAPS	GDAAC	640	20	12.8
MODOCNnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG	PGE20	3	MODAPS	GDAAC	450	36	16.2
MOD28Dmm	MODIS/Terra Sea Surface Temperature QC'd Params Daily L3 Global 4km ISEAG	PGE20	3	MODAPS	GDAAC	380	3	1.14
MO04MDpp	MODIS/Terra Ocean Color and SST Mean Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	67.2	39	2.6208
MO04NDpp	MODIS/Terra Ocean Color and SST Number Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	67.2	39	2.6208
MO04SDpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	67.2	39	2.6208
MO04QDpp	MODIS/Terra Ocean Color and SST Quality Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	34	39	1.326
MO04FDpp	MODIS/Terra Ocean Color and SST Common Flags Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	34	39	1.326
MO041Dpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	34	39	1.326
MO042Dpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	34	39	1.326
MO043Dpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Daily L3 Global 4km CylEqDis	PGE20	3	MODAPS	GDAAC	34	13	0.442
MO36MDpp	MODIS/Terra Ocean Color and SST Mean Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	1.1	39	0.0429

MO36NDpp	MODIS/Terra Ocean Color and SST Number Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	1.1	39	0.0429
MO36SDpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	1.1	39	0.0429
MO36QDpp	MODIS/Terra Ocean Color and SST Number Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	0.6	39	0.0234
MO36FDpp	MODIS/Terra Ocean Color and SST Common Flags Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	0.6	39	0.0234
MO361Dpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	0.6	39	0.0234
MO362Dpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	0.6	39	0.0234
MO363Dpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Daily L3 Global 36km CylEqDis	PGE20	3	MODAPS	GDAAC	0.6	13	0.0078
MO1DMDpp	MODIS/Terra Ocean Color and SST Mean Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DNDpp	MODIS/Terra Ocean Color and SST Number Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DSDpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DQDpp	MODIS/Terra Ocean Color and SST Quality Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.1	39	0.0039
MO1DFDpp	MODIS/Terra Ocean Color and SST Common Flags Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D1Dpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D2Dpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D3Dpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Daily L3 Global 1Deg CylEqDis	PGE20	3	MODAPS	GDAAC	0.1	13	0.0013
					Total/PGE		1002	56.0093
MODOCWnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG	PGE54	3	MODAPS	GDAAC	640	36	23.04
MOD28Wmm	MODIS/Terra Sea Surface Temperature QC'd Params 8-Day L3 Global 4km ISEAG	PGE54	3	MODAPS	GDAAC	640	3	1.92

MO04MWpp	MODIS/Terra Ocean Color and SST Mean Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	67.2	39	2.6208
MO04NWpp	MODIS/Terra Ocean Color and SST Number Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	67.2	39	2.6208
MO04SWpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	67.2	39	2.6208
MO04QWpp	MODIS/Terra Ocean Color and SST Quality Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	34	39	1.326
MO04FWpp	MODIS/Terra Ocean Color and SST Common Flags Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	34	39	1.326
MO041Wpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	34	39	1.326
MO042Wpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	34	39	1.326
MO043Wpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps 8-Day L3 Global 4km CylEqDis	PGE54	3	MODAPS	GDAAC	34	13	0.442
MO36MWpp	MODIS/Terra Ocean Color and SST Mean Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	1.1	39	0.0429
MO36NWpp	MODIS/Terra Ocean Color and SST Number Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	1.1	39	0.0429
MO36SWpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	1.1	39	0.0429
MO36QWpp	MODIS/Terra Ocean Color and SST Quality Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	0.6	39	0.0234
MO36FWpp	MODIS/Terra Ocean Color and SST Common Flags Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	0.6	39	0.0234
MO361Wpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	0.6	39	0.0234
MO362Wpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	0.6	39	0.0234
MO363Wpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps 8-Day L3 Global 36km CylEqDis	PGE54	3	MODAPS	GDAAC	0.6	13	0.0078
MO1DMWpp	MODIS/Terra Ocean Color and SST Mean Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DNWpp	MODIS/Terra Ocean Color and SST Number Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.2	39	0.0078

MO1DSWpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DQWpp	MODIS/Terra Ocean Color and SST Quality Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.1	39	0.0039
MO1DFWpp	MODIS/Terra Ocean Color and SST Common Flags Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D1Wpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D2Wpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D3Wpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps 8-Day L3 Global 1Deg CylEqDis	PGE54	3	MODAPS	GDAAC	0.1	13	0.0013
					Total/PGE		897	38.8388
MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG	PGE51	3	MODAPS	GDAAC	1200	1	1.2
MOD27Y	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG	PGE51	3	MODAPS	GDAAC	1360	1	1.36
MOAPWAxx	MODIS/Terra Ocean Semi-Analytic Primary Production 8-Day L4 Global 4km	PGE51	4	MODAPS	GDAAC	33.6	8	0.2688
MOAPWBxx	MODIS/Terra Ocean Semi-Analytic Primary Production 8-Day L4 Global 36km	PGE51	4	MODAPS	GDAAC	2.1	8	0.0168
MOAPW1xx	MODIS/Terra Ocean Semi-Analytic Primary Production 8-Day L4 Global 1D	PGE51	4	MODAPS	GDAAC	0.28	8	0.00224
MOAPYAyy	MODIS/Terra Ocean Semi-Analytic Primary Production Yearly L4 Global 4km	PGE51	4	MODAPS	GDAAC	33.6	10	0.336
MOAPYByy	MODIS/Terra Ocean Semi-Analytic Primary Production Yearly L4 Global 36km	PGE51	4	MODAPS	GDAAC	2.1	10	0.021
MOAPY1yy	MODIS/Terra Ocean Semi-Analytic Primary Production Yearly L4 Global 1D	PGE51	4	MODAPS	GDAAC	0.28	10	0.0028
					Total/PGE		56	3.20764
MODOCMnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG	PGE73	3	MODAPS	GDAAC	642	36	23.112
MOD28Mmm	MODIS/Terra Sea Surface Temperature QC'd Params Monthly L3 Global 4km ISEAG	PGE73	3	MODAPS	GDAAC	642	3	1.926

MO04MMpp	MODIS/Terra Ocean Color and SST Mean Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	67.2	39	2.6208
MO04NMpp	MODIS/Terra Ocean Color and SST Number Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	67.2	39	2.6208
MO04SMpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	67.2	39	2.6208
MO04QMpp	MODIS/Terra Ocean Color and SST Quality Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	34	39	1.326
MO04FMpp	MODIS/Terra Ocean Color and SST Common Flag Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	34	39	1.326
MO041Mpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	34	39	1.326
MO042Mpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	34	39	1.326
MO043Mpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Monthly L3 Global 4km CylEqDis	PGE73	3	MODAPS	GDAAC	34	13	0.442
MO36MMpp	MODIS/Terra Ocean Color and SST Mean Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	1.1	39	0.0429
MO36NMpp	MODIS/Terra Ocean Color and SST Number Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	1.1	39	0.0429
MO36SMpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	1.1	39	0.0429
MO36QMpp	MODIS/Terra Ocean Color and SST Quality Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	0.6	39	0.0234
MO36FMpp	MODIS/Terra Ocean Color and SST Common Flag Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	0.6	39	0.0234
MO361Mpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	0.6	39	0.0234
MO362Mpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	0.6	39	0.0234
MO363Mpp	MODIS/Terra Ocean Color and SST Common Flags Maps Monthly L3 Global 36km CylEqDis	PGE73	3	MODAPS	GDAAC	0.6	13	0.0078
MO1DMMpp	MODIS/Terra Ocean Color and SST Mean Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DNMpp	MODIS/Terra Ocean Color and SST Number Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.2	39	0.0078

MO1DSMpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DQMpp	MODIS/Terra Ocean Color and SST Quality Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.1	39	0.0039
MO1DFMpp	MODIS/Terra Ocean Color and SST Common Flag Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D1Mpp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D2Mpp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D3Mpp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Monthly L3 Global 1Deg CylEqDis	PGE73	3	MODAPS	GDAAC	0.1	13	0.0013
					Total/PGE		897	38.9168
MODOCNnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG	PGE74	3	MODAPS	GDAAC	642	36	23.112
MOD28Nmm	MODIS/Terra Sea Surface Temperature QC'd Params Yearly L3 Global 4km ISEAG	PGE74	3	MODAPS	GDAAC	642	3	1.926
MO04MNpp	MODIS/Terra Ocean Color and SST Mean Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	67.2	39	2.6208
MO04NNpp	MODIS/Terra Ocean Color and SST Number Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	67.2	39	2.6208
MO04SNpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	67.2	39	2.6208
MO04QNpp	MODIS/Terra Ocean Color and SST Quality Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	34	39	1.326
MO04FNpp	MODIS/Terra Ocean Color and SST Common Flag Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	34	39	1.326
MO041Npp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	34	39	1.326
MO042Npp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	34	39	1.326
MO043Npp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Yearly L3 Global 4km CylEqDis	PGE74	3	MODAPS	GDAAC	34	13	0.442
MO36MNpp	MODIS/Terra Ocean Color and SST Mean Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	1.1	39	0.0429

MO36NNpp	MODIS/Terra Ocean Color and SST Number Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	1.1	39	0.0429
MO36SNpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	1.1	39	0.0429
MO36QNpp	MODIS/Terra Ocean Color and SST Quality Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	0.6	39	0.0234
MO36FNpp	MODIS/Terra Ocean Color and SST Common Flag Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	0.6	39	0.0234
MO361Npp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	0.6	39	0.0234
MO362Npp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	0.6	39	0.0234
MO363Npp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Yearly L3 Global 36km CylEqDis	PGE74	3	MODAPS	GDAAC	0.6	13	0.0078
MO1DMNpp	MODIS/Terra Ocean Color and SST Mean Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DNNpp	MODIS/Terra Ocean Color and SST Number Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DSNpp	MODIS/Terra Ocean Color and SST Std. Dev. Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.2	39	0.0078
MO1DQNpp	MODIS/Terra Ocean Color and SST Quality Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.1	39	0.0039
MO1DFNpp	MODIS/Terra Ocean Color and SST Common Flag Maps Monthly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D1Npp	MODIS/Terra Ocean Color and SST Flag Byte 1 Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D2Npp	MODIS/Terra Ocean Color and SST Flag Byte 2 Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.1	39	0.0039
MO1D3Npp	MODIS/Terra Ocean Color and SST Flag Byte 3 Maps Yearly L3 Global 1Deg CylEqDis	PGE74	3	MODAPS	GDAAC	0.1	13	0.0013
					Total/PGE		897	38.9168

7. SYSTEM OPERATION

The MODIS SDP S/W currently runs at the MODAPS Facility at GSFC under the control of the MODAPS V2 with IRIX Operating System and the MODAPS V3 with LINUX Operating System and at the GES DAAC at GSFC under control of the SDPS, as discussed in Section 1. The MODAPS and DAAC operations include monitoring data product transfers. There are MODAPS to DAAC, DAAC to MODAPS, MODAPS to validation and diagnostic sites, MODAPS to SCF, and DAAC to SCF transfers. All of the data transfers between MODAPS and the DAACs use the ECS SIPS Interface. The MODIS Standard Level 1 products are both produced and archived at the GES DAAC. Most of the Standard MODIS Level 1 Products are exported from the GES DAAC to MODAPS and ingested for use in the processing of the Level 2 to Level 4 MODIS products. Standard MODIS Land Products are exported and archived at either the LP DAAC at EDC or the NSIDC DAAC. Standard Atmosphere and Oceans Products are exported and archived at the GES DAAC.

Table 7-1 lists the MODIS Level 1 products and the Level 2 Cloud Mask and Atmospheric Profiles that are transferred from the GES DAAC to MODAPS. Table 7-2 lists the MODIS Land Products that are exported from MODAPS to the LP and NSIDC DAACs for archive and distribution. Table 7-3 lists the MODIS Atmosphere products that are exported from MODAPS to the GES DAAC for archive and distribution. Table 7-4 lists the MODIS Oceans products which are exported from MODAPS to the GES DAAC for archive and distribution.

There are also interim products that are produced by the MODIS science software. These interim products are stored at the MODAPS facility until they are no longer needed by downstream processing and the MODIS Discipline Teams have completed the QA for these interim products and the associated science archive products. There are a few interim MODIS products produced by PGEs running at the GES DAAC. These interim products are archived for short periods of time at the DAAC. Others are sent to validation sites. Table 7-5 lists the Level 1 products that are not exported to MODAPS for processing. Tables 7-6 to 7-8 list the Land, Atmosphere, and Oceans interim products, respectively.

Some of the MODIS Land and Oceans PGEs generate subsetted and geographical cutout products that are pushed to FTP sites for subsequent pull by validation and diagnostic sites. Table 7-9 lists the Land PGEs that currently have subsetted products that are first stored at MODAPS in the MOD_SS ESDT collection and then exported to MODLAND to be sent to validation sites. Table 7-10 lists the Oceans cutout products that are exported to FTP sites.

Scientists at the SCFs and educational institutions subscribe to selected data products from MODAPS and the DAACs. MODAPS exports products for their MODAPS subscriptions on a regular basis to FTP sites for the SCFs and other groups. The DAAC to SCF transfers are not discussed in this document.

**Table 7-1 MODIS Level 1 and Level 2 Products Transferred from the
GES DAAC to MODAPS**

PGE	Long Name/Product Description	ESDT	Process ID	Production DAAC	Archive DAAC
PGE01	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km	MOD03	MOD_PR03	GES	GES
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	MOD021KM	MOD_PR02	GES	GES
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m	MOD02HKM	MOD_PR02	GES	GES
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m	MOD02QKM	MOD_PR02	GES	GES
PGE03	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km	MOD07_L2	MOD_PR07	GES	GES
PGE03	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	MOD35_L2	MOD_PR35	GES	GES

**Table 7-2 MODIS Land Products Transferred from MODAPS to LP
and NSIDC DAACs**

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE07	MODIS/Terra Snow Cover 5-Min L2 Swath 500m	MOD10_L2	MOD_PR10	MODAPS	NSIDC
PGE08	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km	MOD29	MOD_PR29	MODAPS	NSIDC
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day	MODMGGAD	MOD_PRMGR	MODAPS	LP
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day	MODPT1KD	MOD_PRMGPNTR	MODAPS	LP
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid	MODPTHKM	MOD_PRMGPNTR	MODAPS	LP
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid	MODPTQKM	MOD_PRMGPNTR	MODAPS	LP
PGE13	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid	MOD09GHK	MOD_PRMGR	MODAPS	LP
PGE13	MODIS/Terra Surface Reflectance Daily Global 250m SIN Grid	MOD09GQK	MOD_PRMGR	MODAPS	LP
PGE13	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid	MOD09GST	MOD_PRMGR	MODAPS	LP
PGE16	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	MOD11_L2	MOD_PR11	MODAPS	LP
PGE16	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid	MOD11A1	MOD_PR11	MODAPS	LP
PGE16	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km SIN Grid	MOD11B1	MOD_PR11	MODAPS	LP
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid	MOD09A1	MOD_PR09A	MODAPS	LP
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid	MOD09Q1	MOD_PR09A	MODAPS	LP
PGE23	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid	MOD43B1	MOD_PR43B	MODAPS	LP
PGE23	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid	MOD43B2	MOD_PR43B	MODAPS	LP
PGE23	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid	MOD43B3	MOD_PR43B	MODAPS	LP
PGE23	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid	MOD43B4	MOD_PR43B	MODAPS	LP
PGE24	MODIS/Terra BRDF/Albedo 16-Day L3 Global 0.05Deg CMG	MOD43C1	MOD_PR43C1	MODAPS	LP
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m SIN Grid	MOD13A1	MOD_PR13A1	MODAPS	LP
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid	MOD13Q1	MOD_PR13A1	MODAPS	LP
PGE26	MODIS/Terra Vegetation Indices Monthly L3 Global 1km SIN Grid	MOD13A3	MOD_PR13A3	MODAPS	LP
PGE27	MODIS/Terra Vegetation Indices 16-Day L3 Global 0.05Deg CMG	MOD13C1	MOD_PR13C1	MODAPS	LP

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE28	MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG (Future)	MOD13C2	MOD_PR13C2	MODAPS	LP
PGE29	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid	MOD14A1	MOD_PR14A	MODAPS	LP
PGE29	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid	MOD14A2	MOD_PR14A	MODAPS	LP
PGE30	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	MOD14	MOD_PR14	MODAPS	LP
PGE31	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km SIN Grid	MOD11A2	MOD_PR11A	MODAPS	LP
PGE32	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 0.05Deg CMG	MOD11C1	MOD_PR11C	MODAPS	LP
PGE34	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid	MOD15A2	MOD_PR15A2	MODAPS	LP
PGE35	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid	MOD13A2	MOD_PR13A2	MODAPS	LP
PGE37	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid	MOD17A2	MOD_PR17A2	MODAPS	LP
PGE38	MODIS/Terra Net Primary Production Yearly L4 Global 1km SIN Grid	MOD17A3	MOD_PR17A3	MODAPS	LP
PGE39	MODIS/Terra Net Photosynthesis 8-Day L4 Global 0.05Deg CMG (Future)	MOD17C2	MOD_PR17C2	MODAPS	LP
PGE41	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid	MOD12Q1	MOD_PR12Q	MODAPS	LP
PGE42	MODIS/Terra Land Cover Type Yearly L3 Global 0.05Deg CMG	MOD12C1	MOD_PR12C	MODAPS	LP
PGE43	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid	MOD10A1	MOD_PR10A1	MODAPS	NSIDC
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	MOD29P1D	MOD_PR29A1	MODAPS	NSIDC
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	MOD29P1N	MOD_PR29A1	MODAPS	NSIDC
PGE45	MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid	MOD10A2	MOD_PR10A2	MODAPS	NSIDC
PGE46	MODIS/Terra Snow Cover Daily L3 Global 0.05Deg CMG	MOD10C1	MOD_PR10C1	MODAPS	NSIDC
PGE47	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day (Future)	MOD29P2D	MOD_PR29A2	MODAPS	NSIDC
PGE47	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night (Future)	MOD29P2N	MOD_PR29A2	MODAPS	NSIDC
PGE48	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Day (Future)	MOD29C1D	MOD_PR29C1	MODAPS	NSIDC
PGE48	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Night (Future)	MOD29C1N	MOD_PR29C1	MODAPS	NSIDC
PGE58	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 0.05Deg CMG	MOD11C2	MOD_PR11C2	MODAPS	LP
PGE59	MODIS/Terra Land Surface Temperature/Emissivity 32-Day L3 Global 0.05Deg CMG	MOD11C3	MOD_PR11C3	MODAPS	LP
PGE61	MODIS/Terra Vegetation Continuous Field Yearly L4 Global 1km SIN Grid (Future)	MOD44B	MOD_PR44B	MODAPS	LP
PGE62	MODIS/Terra Thermal Anomalies/Fire 32-Day L3 Global 0.05Deg CMG (Future)	MOD14C3	MOD_PR14C	MODAPS	LP
PGE63	MODIS/Terra Leaf Area Index/FPAR Monthly L4 Global 0.05Deg CMG (Future)	MOD15C2	MOD_PR15C2	MODAPS	LP

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE64	MODIS/Terra Net Primary Production Yearly L4 Global 0.05Deg CMG (Future)	MOD17C3	MOD_PR17C3	MODAPS	LP
PGE65	MODIS/Terra BRDF/Albedo Parameters 16-Day L3 Global 0.05Deg CMG	MOD43C2	MOD_PR43C2	MODAPS	LP
PGE66	MODIS/Terra Vegetation Cover Conversion 32-Day L4 Global 250m SIN Grid	MOD44A	MOD_PR44A	MODAPS	LP
PGE67	MODIS/Terra Snow Cover 8-Day L3 Global 0.05Deg CMG	MOD10C2	MOD_PR10C2	MODAPS	NSIDC
PGE68	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Day (Future)	MOD29C2D	MOD_PR29C2	MODAPS	NSIDC
PGE68	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Night (Future)	MOD29C2N	MOD_PR29C2	MODAPS	NSIDC
PGE75	MODIS/Terra Surface Reflectance Daily L3 Global 0.05Deg CMG	MOD09CMG	MOD_PR09C	MODAPS	LP
PGE82	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 0.05Deg CMG	MOD43C3	MOD_PR43C3	MODAPS	LP
PGE84	MODIS/Terra Sea Ice Extent and IST Daily L3 Global 4km EASE-Grid Day	MOD29E1D	MOD_PR29E	MODAPS	NSIDC

Table 7-3 MODIS Atmosphere Products Transferred from MODAPS to GES DAAC

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE04	MODIS/Terra Aerosol 5-Min L2 Swath 10km	MOD04_L2	MODPR04_05	MODAPS	GES
PGE04	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km	MOD05_L2	MODPR04_05	MODAPS	GES
PGE06	MODIS/Terra Cloud 5-Min L2 Swath 1km and 5km	MOD06_L2	MOD_PR06CT, MOD_PR06CD, MOD_PR06OD	MODAPS	GES
PGE56	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG	MOD08_D3	MOD_PR08D	MODAPS	GES
PGE57	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG	MOD08_M3	MOD_PR08M	MODAPS	GES
PGE70	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG	MOD08_E3	MOD_PR08E	MODAPS	GES
PGE83	MODIS/Terra Aerosol Cloud Water Vapor Subset 5-Min L2 Swath 5km and 10km	MODATML2	MOD_PRATML 2	MODAPS	GES

Table 7-4 MODIS Ocean Products Transferred from MODAPS to GES DAAC

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE09	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day	MODOCL2	MOD_PR18	MODAPS	GES
PGE09	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day	MODOCL2A	MOD_PR18	MODAPS	GES
PGE09	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day	MODOCL2B	MOD_PR18	MODAPS	GES
PGE09	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	MODOCQC	MOD_PR18	MODAPS	GES
PGE10	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km	MOD28L2	MOD_PR28	MODAPS	GES
PGE10	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km	MOD28QC	MOD_PR28	MODAPS	GES
PGE17	MODIS Preprocessed NMC Ancillary Data for Oceans Processes 6-Hr L3 Global 1Deg	MODOCNMC	MOD_PRNMC	MODAPS	GES
PGE18	MODIS Preprocessed REYNSST Ancillary Data Weekly L3 Global 1x1Deg	MODOCREY	MOD_PRREY	MODAPS	GES
PGE19	MODIS Preprocessed TOMS Ozone Data for Oceans Processes Daily L3 Global 1x1.25 Deg	MODOCOZN	MOD_PROZN	MODAPS	GES
PGE20	MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 4km CylEqDis	MO04MA## (where ## = 41...61, 63...66, 69...78)	MOD_PRmmap	MODAPS	GES
PGE20	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG	MODOQAqq (where qq = 51...61, 63...66)	MOD_PRmtbin	MODAPS	GES
PGE20	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG	MODSQArr (where rr = D1...D9, DA, N1...N9, NA)	MOD_PRmtbin	MODAPS	GES
PGE20	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG	MODOCNnn (where nn = 1...36)	MOD_PRmtbin	MODAPS	GES
PGE20	MODIS/Terra Sea Surface Temperature QC'd Params Daily L3 Global 4km ISEAG	MOD28Dmm (where mm = D1,N1,N2)	MODPRmtbin	MODAPS	GES
PGE20	MODIS/Terra Ocean Color and SST {Mean}Maps Daily L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D} {M,S,N,Q,F, 1,2,3} Dpp (where pp = 1...36 or D1,N1,N2)	MOD_PRmtbin	MODAPS	GES
PGE51	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG	MOD27W	MOD_PR27W	MODAPS	GES
PGE51	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG	MOD27Y	MOD_PR27Y	MODAPS	GES

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis	MOAPW _{Axx} (where xx = M1,M2,ME, MD,N1,N2, F1,F2)	MOD_PR27W	MODAPS	GES
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis	MOAPW _{Bxx} (where xx = M1,M2,ME, MD,N1,N2, F1,F2)	MOD_PR27W	MODAPS	GES
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis	MOAPW _{1xx} (where xx = M1,M2,ME, MD,N1,N2, F1,F2)	MOD_PR27W	MODAPS	GES
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis	MOAPY _{Ayy} (where yy = M1,M2,S1, S2,W1,W2, N1,N2,F1,F2)	MOD_PR27Y	MODAPS	GES
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis	MOAPY _{Byy} (where yy = M1,M2,S1, S2,W1,W2, N1,N2,F1,F2)	MOD_PR27Y	MODAPS	GES
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis	MOAPY _{1yy} (where yy = M1,M2,S1, S2,W1,W2, N1,N2,F1,F2)	MOD_PR27Y	MODAPS	GES
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 4km CylEqDis (Future TBD)	MOSPY _{Axx} (where xx = MP,MN,MX, MC,SC,WC, NC,FC)	MOD_PR27HV	MODAPS	GES
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 36km CylEqDis (Future TBD)	MOSPY _{Bxx} (where xx = MP,MN,MX, MC,SC,WC, NC,FC)	MOD_PR27HV	MODAPS	GES
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 1Deg CylEqDis (Future TBD)	MOSPY _{1xx} (where xx = MP,MN,MX, MC,SC,WC, NC,FC)	MOD_PR27HV	MODAPS	GES
PGE52	MODIS/Terra Ocean Chlorophyll Running Year Average 8-Day L3 Global 4km ISEAG (Future TBD)	MODOCY27	MOD_PRmtbin	MODAPS	GES
PGE52	MODIS/Terra Ocean Annual Empirical Productivity 8-Day L4 Global 4km ISEAG (Future TBD)	MOD27HV	MOD_PR27HV	MODAPS	GES
PGE54	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG	MODOCW _{nn} (where nn = 1...36)	MOD_PRmtbin	MODAPS	GES

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE54	MODIS/Terra Sea Surface Temperature QC'd Params 8-Day L3 Global 4km ISEAG	MOD28Wmm (where mm = D1,N1,N2)	MOD_PRmtbin	MODAPS	GES
PGE54	MODIS/Terra Ocean Color and SST {Mean}Maps 8-Day L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D} {M,S,N,Q,F,1,2,3} Wpp (where pp = 1...36 or D1,N1,N2)	MOD_PRmmap	MODAPS	GES
PGE73	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG	MODOCMnn (where nn = 1...36)	MOD_PRmtbin	MODAPS	GES
PGE73	MODIS/Terra Sea Surface Temperature QC'd Params Monthly L3 Global 4km ISEAG	MOD28Mmm (where mm = D1,N1,N2)	MOD_PRmtbin	MODAPS	GES
PGE73	MODIS/Terra Ocean Color and SST {Mean}Maps Monthly L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D} {M,S,N,Q,F,1,2,3} Mpp (where pp = 1...36 or D1,N1,N2)	MOD_PRmmap	MODAPS	GES
PGE74	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG	MODOCNnn (where nn = 1...36)	MOD_PRmtbin	MODAPS	GES
PGE74	MODIS/Terra Sea Surface Temperature QC'd Params Yearly L3 Global 4km ISEAG	MOD28Nmm (where mm = D1,N1,N2)	MOD_PRmtbin	MODAPS	GES
PGE74	MODIS/Terra Ocean Color and SST {Mean}Maps Yearly L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D} {M,S,N,Q,F,1,2,3} Npp (where pp = 1...36 or D1,N1,N2)	MOD_PRmmap	MODAPS	GES

Table 7-5 MODIS Level 1 Products Not Transferred for MODAPS Processing

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	MOD01	MOD_PR01	GES	GES
PGE02	MOD/Terra QA Summary of Calibrated Radiances 1km	MOD021QA	MOD_PR02	GES	GES
PGE02	MODIS/Terra On-Board Calibrator and Engineering Data	MOD02OBC	MOD_PR02	GES	GES
PGE03	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km	MOD35_QC	MOD_PR35	GES	GES
PGE03	MODIS/Terra Vertical Profiles Diagnostics 5-Min L2 5km	MOD07_QC	MOD_PR07	GES	GES
PGE03	MODIS/Terra Clear Sky Radiance Statistics 5-Min L2 25km	MODCSR_G	MOD_PRCsr	GES	GES
PGE03	MODIS/Terra Volcano Alert 5Min L2	MODVOLC	MOD_PRVOLC	GES	GES
PGE71	MODIS/Terra Subsampled Raw Radiances in Counts 5-Min L1A Swath	MOD01SS	MOD_PR01SS	GES	GES

Table 7-6 MODIS Land Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE07	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km	MOD10L2C	MOD_PR10	MODAPS
PGE08	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km	MOD29L2C	MOD_PR29	MODAPS
PGE11	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km	MOD02CRS	MOD_PR02CRS	MODAPS
PGE11	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-Min L2 Swath 5km	MOD02CSS	MOD_PR02CRS	MODAPS
PGE11	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km	MOD09	MOD_PR09	MODAPS
PGE11	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km	MOD09CRS	MOD_PR09	MODAPS
PGE11	MODIS/Terra Interim Surface Reflectance North Polar Region 1-Orbit L3 5km CMG	MOD09IDN	MOD_PR09	MODAPS
PGE11	MODIS/Terra Interim Surface Reflectance South Polar Region 1-Orbit L3 5km CMG	MOD09IDS	MOD_PR09	MODAPS
PGE11	MODIS/Terra Interim Surface Reflectance Non-Polar Region 1-Orbit L3 5km CMG	MOD09IDT	MOD_PR09	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night (Exported only when requested)	MODPT1KN	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day	MODPTPGD	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night	MODPTPGN	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Day (Future)	MODPTPHD	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Night (Exported only when requested)	MODMGGAN	MOD_PRMGR	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day	MODMGPGD	MOD_PRMGR	MODAPS
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day	MOD14GD	MOD_PRMGR	MODAPS
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night	MOD14GN	MOD_PRMGR	MODAPS
PGE14	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid	MOD10L2G	MOD_PRMGR	MODAPS
PGE15	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day	MOD29PGD	MOD_PRMGR	MODAPS
PGE15	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night	MOD29PGN	MOD_PRMGR	MODAPS
PGE16	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km SIN Grid	MOD11UPD	MOD_PR11	MODAPS
PGE21	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km SIN Grid	MOD09A1C	MOD_PR09A	MODAPS
PGE22	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid	MODAGAGG	MOD_PRAGG	MODAPS
PGE22	MODIS/Terra BRDF Texture Database Daily L3 Global 1km SIN Grid	MODAGTEX	MOD_PRAGG	MODAPS
PGE23	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km SIN Grid	MOD43B1C	MOD_PR43B	MODAPS

PGE	Product Description	ESDT	Process ID	Production Center
PGE23	MODIS/Terra Coarse BRDF/Albedo Model-2 16-Day L3 Global 5km SIN Grid	MOD43B2C	MOD_PR43B	MODAPS
PGE23	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km SIN Grid	MOD43B3C	MOD_PR43B	MODAPS
PGE23	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km SIN Grid	MOD43B4C	MOD_PR43B	MODAPS
PGE29	MODIS/Terra Coarse Thermal Anomalies/Fire Daily L3 Global 5km SIN Grid	MOD14A1C	MOD_PR14A	MODAPS
PGE29	MODIS/Terra Coarse Thermal Anomalies/Fire 8-Day L3 Global 5km SIN Grid	MOD14A2C	MOD_PR14A	MODAPS
PGE30	MODIS/Terra Coarse Thermal Anomalies/Fire 5-Min L2 Swath 1km	MOD14CRS	MOD_PR14	MODAPS
PGE33	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid	MOD15A1	MOD_PR15A1	MODAPS
PGE33	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global 5km SIN Grid	MOD15A1C	MOD_PR15A1	MODAPS
PGE34	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km SIN Grid	MOD15A2C	MOD_PR15A2	MODAPS
PGE35	MODIS/Terra Vegetation Indices 16-Day L3 Global 5km SIN Grid	MOD13A2C	MOD_PR13A2	MODAPS
PGE36	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid	MOD17A1	MOD_PR17A1	MODAPS
PGE37	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km SIN Grid	MOD17A2C	MOD_PR17A2	MODAPS
PGE38	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km SIN Grid	MOD17A3C	MOD_PR17A3	MODAPS
PGE40	MODIS/Terra Land Cover Database 32-Day L3 Global 1km SIN Grid	MOD12M	MOD_PR12M	MODAPS
PGE41	MODIS/Terra Coarse Land Cover Type Yearly L3 Global 5km SIN Grid	MOD12Q1C	MOD_PR12Q	MODAPS
PGE60	MODIS/Terra Geolocation Control Point Residuals 5-Min L2 50m	MOD03CP	MOD_PR03CP	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 250m SIN Grid	MOD44CQ	MOD_PR44C	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 500m SIN Grid	MOD44CH	MOD_PR44C	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L3 Global	MOD44CT	MOD_PR44C	MODAPS
PGE80	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 500m SIN Grid	MODHDFSR	MOD_PRDFSR	MODAPS
PGE80	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 250m SIN Grid	MODQDFSR	MOD_PRDFSR	MODAPS
All Land	MODIS/Terra Land Quality Assurance	MODLM_QA	MOD_PRLQA	MODAPS
Several Land	MODIS/Terra Land Subsetting QA Files	MOD_SS	MOD_PRSS	MODAPS

Table 7-7 MODIS Atmosphere Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE04	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2	MOD04_QC	MOD_PR04_05	MODAPS
PGE04	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2	MOD05_QC	MOD_PR04_05	MODAPS
PGE04	MODIS/Terra MOD_PR05 Final Diagnostic File for Corrected Water Vapor 5-Min L2 (Future)	MOD5C_QC	MOD_PR04_05	MODAPS
PGE05	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km ISIN Grid (Not in current operations)	MOD04L_O	MOD_PR04LO	MODAPS
PGE06	MODIS/Terra MOD_PRO6CT QC File for Cloud Top Algorithm 5-Min L2	MOD6CTQC	MOD_PR06CT	MODAPS
PGE06	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2	MOD6CDQC	MOD_PR06CD	MODAPS
PGE06	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2	MOD6ODQC	MOD_PR06OD	MODAPS
PGE06	MODIS/Terra Cloud Product Temporary File in HDF Format 5-Min L2	MOD6ANCT	MOD_PR06OD	MODAPS
PGE55	MODIS/Terra Clear Sky Radiance Statistics Daily L3 Global 25km Equal Area (Future)	MODCSR_D	MOD_PRSCRD	GES
PGE56	MODIS/Terra Aerosol/Water Vapor/Cloud Daily L3 Global 0.1Deg CMG	MOD08D3H	MODPR08	MODAPS
PGE69	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG	MOD08_TL	MOD_PR08T	MODAPS
PGE69	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG	MOD08TLH	MODPR_08TL	MODAPS
PGE81	MODIS/Terra Clear Sky Radiance Running Statistics 8-Day L3 Global 25km Equal Area (Future)	MODCSR_8	MOD_PRCR8	GES

Table 7-8 MODIS Oceans Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE09	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG	MODOQBqq (where qq = 51...61, 63...66)	MOD_PRmsbin	MODAPS
PGE09	MODIS/Terra Ocean Color Space-Binned Composite Params 1-26 5-Min L3 Global 1km ISEAG	MODOCBnn (where nn = 1...36)	MOD_PRmsbin	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 5-Min L3 Global 1km ISEAG	MOD28Bmm (where mm = D1,N1,N2)	MOD_PRmsbin	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG	MODSQBrr (where rr = D1...D9, DA, N1...N9, NA)	MOD_PRmfill	MODAPS
PGE20	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 1km ISEAG	MODOCAnn (where nn = 1...36)	MOD_PRmtbin	MODAPS
PGE20	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params Daily L3 Global 4km ISEAG	MOD28Amm (where mm = D1,N1,N2)	MOD_PRmtbin	MODAPS
PGE20	MODIS/Terra Interim Ocean Color and SST QC {Mean}Maps Daily L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO36MA## (where ## = 51...61, 63...66, 69...78)	MOD_PRmmap	MODAPS
PGE49	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (Not in current operations)	MODOCEnn (where nn = 1...36)	MOD_PRmtbin	MODAPS
PGE49	MODIS/Terra Sea Surface Temperature Interim Composite Params 8-Day L3 Global 4km ISEAG (Not in current operations)	MOD28Emm (where mm = D1,N1,N2)	MOD_PRmtbin	MODAPS
PGE50	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (Not in current operations)	MODOCRnn (where nn = 1...36)	MOD_PRmfill	MODAPS
PGE50	MODIS/Terra Sea Surface Temperature Interim Composite Params 24-Day L3 Global 4km ISEAG (Not in current operations)	MOD28Rmm (where mm = D1,N1,N2)	MOD_PRmfill	MODAPS

Table 7-9 MODIS Subsetted Land Products Stored in MOD_SS ESDT

PGE	Parent Product Description	Parent ESDT	Process ID	Production Center
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day	MODPT1KD	MOD_PRSS	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night	MODPT1KN	MOD_PRSS	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid Day	MODPTHKM	MOD_PRSS	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid Day	MODPTQKM	MOD_PRSS	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day	MODMGGAD	MOD_PRSS	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Night	MODMGGAN	MOD_PRSS	MODAPS
PGE13	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid	MOD09GHK	MOD_PRSS	MODAPS
PGE13	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid	MOD09GQK	MOD_PRSS	MODAPS
PGE13	MODIS/Terra Surface Reflectance Daily L2G Global 1km SIN Grid	MOD09GST	MOD_PRSS	MODAPS
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day	MOD14GD	MOD_PRSS	MODAPS
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night	MOD14GN	MOD_PRSS	MODAPS
PGE14	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid	MOD10L2G	MOD_PRSS	MODAPS
PGE16	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	MOD11_L2	MOD_PRSS	MODAPS
PGE16	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km	MOD11A1	MOD_PRSS	MODAPS
PGE16	MODIS/Terra Geolcation Fields 5-Min L1A Swath 1km	MOD03	MOD_PRSS	MODAPS
PGE16	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	MOD021KM	MOD_PRSS	MODAPS
PGE16	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	MOD35_L2	MOD_PRSS	MODAPS
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid	MOD09A1	MOD_PRSS	MODAPS
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid	MOD09Q1	MOD_PRSS	MODAPS
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid	MOD09Q1	MOD_PRSS	MODAPS
PGE22	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 250m SIN Grid	MODAGAGG	MOD_PRSS	MODAPS

PGE	Parent Product Description	Parent ESDT	Process ID	Production Center
PGE22	MODIS/Terra BRDF Texture Database Daily L3 Global 250m SIN Grid	MODAGTEX	MOD_PRSS	MODAPS
PGE23	MODIS/Terra BRDF/Albedo Model 1 16-Day L3 Global 1km SIN Grid	MOD43B1	MOD_PRSS	MODAPS
PGE23	MODIS/Terra BRDF/Albedo Model 2 16-Day L3 Global 1km SIN Grid	MOD43B2	MOD_PRSS	MODAPS
PGE23	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid	MOD43B3	MOD_PRSS	MODAPS
PGE23	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid	MOD43B4	MOD_PRSS	MODAPS
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m SIN Grid	MOD13A1	MOD_PRSS	MODAPS
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid	MOD13Q1	MOD_PRSS	MODAPS
PGE29	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid	MOD14A1	MOD_PRSS	MODAPS
PGE29	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid	MOD14A2	MOD_PRSS	MODAPS
PGE31	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km SIN Grid	MOD11A2	MOD_PRSS	MODAPS
PGE33	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid	MOD15A1	MOD_PRSS	MODAPS
PGE34	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid	MOD15A2	MOD_PRSS	MODAPS
PGE35	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid	MOD13A2	MOD_PRSS	MODAPS
PGE37	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid	MOD17A2	MOD_PRSS	MODAPS
PGE38	MODIS/Terra Net Primary Production Yearly L4 Global 1km SIN Grid	MOD17A3	MOD_PRSS	MODAPS
PGE40	MODIS/Terra Land Cover Database 32-Day L3 Global 1km SIN Grid	MOD12M	MOD_PRSS	MODAPS
PGE41	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid	MOD12Q1	MOD_PRSS	MODAPS
PGE43	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid	MOD10A1	MOD_PRSS	MODAPS
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	MOD29P1D	MOD_PRSS	MODAPS
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	MOD29P1N	MOD_PRSS	MODAPS
PGE45	MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid	MOD10A2	MOD_PRSS	MODAPS
PGE66	MODIS/Terra Vegetation Cover Conversion 32-Day L3 Global 250m SIN Grid	MOD44A	MOD_PRSS	MODAPS

Table 7-10 MODIS Ocean Cutout Products Transferred from MODAPS to FTP Site

PGE	Parent Product Description	Parent ESDT	Process ID	Production Center
PGE09	MODIS/Terra Ocean Color Radiance Products Site Cutouts L2 1km	MOCOCL2	MOD_PRmsub	MODAPS
PGE09	MODIS/Terra Ocean Color Derived Products Group 1 Site Cutouts L2 1km	MOCOCL2A	MOD_PRmsub	MODAPS
PGE09	MODIS/Terra Ocean Color Derived Products Group 2 Site Cutouts L2 1km	MOCOCL2B	MOD_PRmsub	MODAPS
PGE09	MODIS/Terra Ocean Color QC Products Site Cutouts L2 1km	MOCOCQC	MOD_PRmsub	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature Products Site Cutouts L2 1km	MOC28L2	MOD_PRmsub	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature QC Products Site Cutouts L2 1km	MOC28QC	MOD_PRmsub	MODAPS
PGE79	MODIS/Terra Calibrated Radiances Site Cutouts L1B 1km	MOC021KM	MOD_PRmsubl	MODAPS

The activation rules for each PGE will be incorporated into Production Rules during the development of the PGE scripts, Loaders, and Recipes for MODAPS and during SSI&T at the GES DAAC. The production rules which are required by MODIS and are currently available are Basic Temporal, Advanced Temporal, Nearest Temporal Match, Orbit-Based Activation, Period Specification, Start_of_N_Days, Smart_Start_of_Year, Optional Inputs, Alternate Inputs, Latitude/Longitude Tiling, Zonal Tiling, Metadata Based Activation, Metadata Based Query, Minimum-Number of Granules, Runtime Parameters, and Data Day (special case of runtime parameters). The production scenario for each of the PGEs delivered to MODAPS or to the GES DAAC will be built from the Production Rules as described in this SDD. The detailed information delivered with the PGE to the DAAC is fine-tuned at SSI&T. If necessary, MODAPS provides customized production scenarios for individual PGEs.

The PGE error reporting in the SDP S/W is limited to success or failure. MODIS PGEs will return a value of 0 for success. PGE processes will return a value of 1 for failure. Instructions for each error message requiring action by the DAAC operations staff will be provided with the PGE delivery. In general, PGEs that return failure in the DAAC will require manual investigation by DAAC, ECS, and MODIS personnel. These instructions are also used by the MODAPS operations staff.

MODIS PGEs are grouped into Recipes for operations at MODAPS. Criteria used for grouping are the following:

1. MODIS Science Discipline (Atmosphere, Land, Oceans) processing or Level 1 processing with a separate series of recipes for each.
2. Temporal processing periods (5-minute, daily, 8-day, 16-day, monthly, 32-day, 96-day, yearly)

3. Processing Level (L1A, L1B, L2, L2G, L3, or L4).
4. Similarity of input products.
5. Similarity of production rules.

The current Recipe and PGE Dependency information is shown in Table 7-11. The first two columns of this table contain the names of the Recipes and operational dependencies for scheduling the recipes to run in production. All recipes depend on completion of other recipes or ingest of specified data from the GES DAAC or MODIS SCFs. The remaining nine columns associated with a recipe contain the PGEs that are included in the recipe, the production rules for each PGE, the ESDT input products for each PGE, the ESDT output products made by each PGE, the data time range covered by the recipe, and the temporal period covered by the output granules with the associated number of granules and frequency of the output.

The ESDT inputs include MODIS data products, external ancillary data, spacecraft attitude and ephemeris data, and bucket ESDTs containing static files. The ESDT outputs include MODIS standard products, MODIS interim products, subsetted products, diagnostic products, QA products containing metadata, browse products, and temporary files. All of these data, except for browse products, are listed with descriptive information in the other tables in the document. Many browse products are currently under development and are being added frequently to operational PGEs. A table for browse products is planned for future documents when the number of additions has stabilized. Since the Recipe and PGE Dependency table changes frequently, users should go to the latest version from the MODIS System Description Web Page to view any recent updates.

Table 7-11. MODAPS V2 Recipe and PGE Dependency Table

Notes: Terra Recipes begin with “AM1M”; Aqua Recipes begin with “PM1M”; Combined Terra + Aqua Recipes begin with “AMPM”.
 ESDTs are Terra names; for Aqua replace the “MO” with “MY”; for Combined Terra + Aqua replace the “MO” with “MC”.
 (Not all PGEs make combined products; some Land PGEs currently make only Terra and Combined products; they do not make Aqua products.)
 nn = one of parameters 1 through 36; mm = one of parameters D1, D2, N1, N2 (D2 is generated by PGE10 but not passed downstream at MODAPS);
 pp = one of parameters 1 through 36, D1, N1, N2 (Flag Byte 3 in the maps is only produced for parameters 13-25);
 qq = one of parameters 51-61, 63-66; rr = one of parameters D1-D9, DA, N1-N9, NA; ## = one of parameters 41-61, 63-66, or 69-78;
 xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2; yy = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2;
 zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC
 For PGEs that make tiled products, the number of files listed is the maximum number processed in MODAPS.

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
GDAAC 0b	GDAAC: Receipt of 2 hours of AM1EPHNF from FDD and 2 hours of AM1ATTN0 from FDD for processing period. Preceding 2 hours is desired also. Receipt of 2 hours of MOD000 from EDOS for current processing period. Preceding 2 hours of MOD000 is desired also. MODAPS: Ingest of AM1EPHNF, AM1ATTN0, and either MOD01SS or MOD01 from GDAAC.	PGE01 Level 1A Raw Radiance/ Geolocalization	Basic Temporal, Advanced Temporal, Optional Inputs	1	MOD000, AM1EPHNF & (AM1ATTN0 or AM1ATTNF) or PM1EPHND & PM1ATTNR, MOD01LUT(Static), MOD03LUT(Static)	MOD01, MOD03	2 Hours	5 min. 24 granules / 2-hours
GDAAC 1	GDAAC: Completion of PGE01. MODAPS: Completion of Recipe 0b or Ingest of MOD01 and MOD03 from GDAAC.	PGE02 Level 1B Calibration	Basic Temporal, Advanced Temporal, Optional Inputs	1	MOD01, MOD03, MOD02LUT(Static)	MOD021KM, MOD02HKM, MOD02QKM, MOD02OBC, MOD021QA	2 Hours	5 min. 24 granules / 2-hours
GDAAC 1c	Completion of Recipe 1 or equivalent processing at GDAAC. GDAS_0ZF and SEA_ICE with SingleDateTime nearest to midpoint of current processing period; NISE with midpoint of RangeDateTime nearest to midpoint of current processing period. PGE03 inputs MOD02QKM only in Day or Both Modes.	PGE03 Level 2 Cloud Mask/ Atmospheric Profiles	Basic Temporal, Advanced Temporal, Optional Inputs	2	MOD021KM, MOD02QKM, MOD03, GDAS_0ZF, NISE, SEA_ICE, MOD35ANC(Static), MOD07LUT(Static)	MOD35_L2, MOD35_QC, MOD07_L2, MOD07_QC, MODVOLC, MODCSR_G, Six temporary files	2 Hours	5 min. 24 granules / 2-hours

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
GDAAC 1d	Completion of Recipe 0 or equivalent processing at GDAAC.	PGE71 Level 1A Oceans Sub-Setting	Basic Temporal	1 A	MOD01	MOD01SS	1 Day	5 min 288 granules / day
A1	<p>Receipt of 2 hours of Level 1 5-minute granules of data from GDAAC for current processing period.</p> <p>GDAS_0ZF with SingleDateTime overlapping midpoint of current processing period.</p> <p>OZ_DAILY and SEA_ICE with SingleDateTime nearest to midpoint of current processing period.</p> <p>NISE with midpoint of RangeDateTime overlapping the midpoint of current processing period.</p> <p>REYNSST weekly file that overlaps or is nearest current processing period.</p> <p>PGE04 inputs MOD02HKM and MOD02QKM only in Day or Both Modes.</p> <p>PGE83 inputs products from PGE01, PGE03, PGE04, and PGE06.</p>	PGE04 Level 2 Atmosphere	Basic Temporal, Advanced Temporal, Nearest Temporal Match	2	MOD03, MOD021KM, MOD02HKM, MOD02QKM, MOD35_L2, MOD07_L2, GDAS_0ZF, OZ_DAILY, MOD05LUR(Static), MOD05LUW(Static), MOD04LUT(Static), MOD5CLUR(Static)	MOD04_L2, MOD04_QC, MOD05_L2, MOD05_QC, MOD5C_QC (Future), Three temporary files	1 Day	5 min. 288 granules / day
		PGE06 Level 2 Clouds	Basic Temporal, Advanced Temporal, Nearest Temporal Match, Optional Inputs	2	MOD021KM, MOD03, MOD35_L2, GDAS_0ZF, REYNSST, SEA_ICE, NISE, MOD06LUT(Static), MOD35ANC(Static), MOD04LUT(Static)	MOD06_L2, MOD6CTQC, MOD6CDQC, MOD6ODQC, MOD6ANCT, Three temporary files	1 Day	5 min. 288 granules / day
		PGE83 Level 2 Subsetted Atmosphere Product	Basic Temporal, Optional Inputs	2	MOD03, MOD07_L2, MOD35_L2, MOD04_L2, MOD05_L2, MOD06_L2	MODATML2	1 Day	5 min. 288 granules / day
A2	Completion of Recipe A1 for all granules in current processing day.	PGE69 Level 3 Daily Atmosphere Zonal Tiling	Period Specification, Meta. Based Query, Min. # of Granules, Zonal Tiling	3	MOD04_L2, MOD05_L2, MOD06_L2, MOD07_L2	MOD08_TL, MOD08TLH	1 Day	1 day 36 tiles / day
A3	Completion of Recipe A2 for all 36 zones in current processing day.	PGE56 Level 3 Daily Atmosphere	Period Specification, Min. # of Granules	3	MOD08_TL, MOD08TLH	MOD08_D3, MOD08D3H	1 Day	1 day 1 / day
A4	Completion of Recipe A3 for all days in the current 8-day processing period.	PGE70 Level 3 8-Day Atmosphere	Period Start of 8 Days, Min. # of Granules	3	MOD08_D3	MOD08_E3	8 Days	8 days 1 / 8 days
A5	Completion of Recipe A4 for all 8-day periods overlapping the current processing month.	PGE57 Level 3 Monthly Atmosphere	Period Specification, Min. # of Granules	3	MOD08_D3	MOD08_M3	1 Month	1 month 1 / month

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L1	Receipt of 2 hours of Level 1 5-minute granules of data from GDAAC for current processing period.	PGE07 Level 2 Snow Cover	Basic Temporal, Meta. Based Query	2	MOD02HKM, MOD021KM, MOD03, MOD35_L2	MOD10_L2, MOD10L2C, MODLM_QA, BROWSE	1 Day	5 min. 164 granules / day
	In PGE07 Snow Cover products are only produced for Day and Both Modes.	PGE08 Level 2 Sea Ice	Basic Temporal, Meta. Based Query	2	MOD021KM, MOD03, MOD35_L2	MOD29, MOD29L2C, MODLM_QA	1 Day	5 min. 180 granules / day
	In PGE08 Sea Ice products are produced only for high North and South geographical areas.	PGE30 Level 2 Thermal Anomalies/Fire	Basic Temporal, Runtime Parameters	2	MOD021KM, MOD03	MOD14, MOD14CRS, MODLM_QA	1 Day	5 min. 288 granules / day
L2	Completion of Recipe L3 for current processing period.	PGE60 Geolocation Control Point	Basic Temporal, Optional Inputs	2	MOD02QKM, MOD03, MOD09, MOD35_L2, MOD10_L2, MOD29, MODCPLUT(Static)	MOD03CP	1 Day	5 min 288 granules / day
L3	<p>Receipt of 2 hours of Level 1 5-minute granules of data from GDAAC for orbit in current processing period.</p> <p>All 4 files of GDAS_0ZF for the day corresponding to the start time of the orbit .</p> <p>OZ-DAILY daily file for day corresponding to start of orbit and if orbit start time is 12:00 or earlier, stage file for preceding day; if orbit end time is 12:00 or later , stage file for day following end of orbit.</p> <p>MOD02HKM and MOD02QKM are input only for Day and Both Modes.</p>	PGE11 Level 2 Land Surface Reflectance	Orbit-Based Activation, Optional Inputs, Advanced Temporal, Min. # of Granules, Runtime Parameters	2	MOD021KM, MOD02HKM MOD02QKM, MOD03, MOD35_L2, GDAS_0ZF, OZ_DAILY, MOD09LU1(Static), MOD09LU2(Static), MOD09LU3(Static),	MOD09, MOD09CRS, MOD02CRS, MOD02CSS, MOD09IDN, MOD09IDS, MOD09IDT, MODLM_QA	1 Orbit	5 min. ~ 18 granules / orbit

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L4	Completion of Recipe L1 for all 5-minute granule periods in current processing day and availability of a previous 16-day MOD43B1C from Recipe L12. PGE16 is run in two parts: L4 and L4d. L4 must be completed for the day before L4d begins. Currently only the Combined Terra + Aqua MCD43B1 product is made in Recipe L12 for input to Aqua PGE16. For Aqua Recipe s, PGE16 first takes MYD43B1C , then takes MCD43B1, and if neither is available, runs without either. Currently MOD12Q1 is staged from the static file area.	PGE16 Level 2 and Level 3 Land Surface Temperature	Period Specification, Advanced Temporal, Zonal Tiling, Min. # of Granules, File Update	2,3	MOD021KM, MOD03, MOD35_L2, MOD07_L2, MOD10_L2, MOD12Q1, MOD43B1C (Terra) (Previous) or MCD43B1C (Combined) (Previous), MOD11LCV(Static), MOD11LUW(Static)	MOD11_L2, MOD11A1, MOD11B1, MOD11UPD, MOD_SS, MODLM_QA, BROWSE	1 Day	1 day 317 tiles / day
L5	Completion of Recipes L1 and L3 for current processing day. Currently MOD12Q1 is staged from the static file area Note: PGE12 is also in L5P.	PGE12 Level 2G Pointers	Period Specification, Lat/Long Tiling, Meta. Based Query, Min. # of Granules, Runtime Parameters	2 G	MODO3	MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM MODMGGAD, MOD_SS , MODLM_QA	1 Day	1 day Average 357 tiles / day; (Expected Export 294)
		PGE13 Level 2G Land Surface Reflectance/ Fire	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2 G	MOD09, MODPTHKM, MODPTQKM, MOD14, MODPT1KD, MODPT1KN	MOD09GHK, MOD09GQK, MOD09GST, MOD14GD, MOD14GN, MOD_SS, MODLM_QA	1 Day	1 day 294 tiles/ day
		PGE14 Level 2G Snow Cover	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2 G	MOD10_L2, MODPTHKM	MOD10L2G, MOD_SS, MODLM_QA	1 Day	1 day 317 tiles / day
		PGE22 Level 3 Daily Aggregation	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM, MODMGGAD	MODAGAGG, MODAGTEX, MOD_SS, MODLM_QA	1 Day	1 day 294 tiles / day

7-23

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L9	Completion of Recipe L5 for all daily tiles in the Land Tile Scheme for the current processing day.	PGE46 Level 3 Daily Snow Cover CMG.	Period Specification, Min. # of Granules	3	MOD10A1, MOD10LUC(Static)	MOD10C1, MODLM_QA	1 Day	1 day 1 file / day
L10	<p>Completion of Recipe L5 for all tiles in the Land Tile Scheme for all days in the current 8-day processing period.</p> <p>Completion of Recipe L4 for all days in the current 8-day processing period.</p> <p>PGE34 requires at least 2 days of input MOD15A1 from PGE33 in Recipe L5.</p> <p>PGE45 requires at least 2 days of input MOD10A1 from PGE43 in Recipe L5.</p>	PGE21 Level 3 Land 8-Day Surface Reflectance	Period Start of 8 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODPTHKM, MODPTQKM, MOD09GHK, MOD09GQK, MOD09GST, MODMGGAD	MOD09A1, MOD09A1C, MOD09Q1, MOD_SS, MODLM_QA, BROWSE	8 Days	8 days 294 tiles / 8 days
		PGE29 Level 3 Daily and 8- Day Thermal Anomalies/Fire	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD14GD, MOD14GN	MOD14A1, MOD14A2, MOD14A1C, MOD14A2C, MOD_SS, MODLM_QA	8 Days	8 day 286 tiles / 8 days
		PGE31 Level 3 8-Day Land Surface Temperature	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD11A1	MOD11A2, MOD_SS, MODLM_QA	8 Days	8 day 317 tiles / 8 days
		PGE34 Level 4 8-Day Leaf Area Index/FPAR	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	4	MOD15A1, MOD15LU8 (Static)	MOD15A2, MOD15A2C, MOD_SS, MODLM_QA, BROWSE	8 Days	8 day 286 tiles / 8 days
		PGE 45 Level 3 8-Day Snow Cover	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD10A1	MOD10A2, MOD_SS, MODLM_QA, BROWSE	8 Days	8 day 317 tiles / 8 days
L11	Completion of Recipe L10 for all 8-day tiles of input data in the Land Tile Scheme for PGE45.	PGE67 Level 3 8-Day Snow Cover CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MOD10A2, MOD10LUC (Static)	MOD10C2, MODLM_QA	8 Days	8 day 1 / 8 days

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L12	<p>Completion of Recipes L4 and L5 for all tiles in the Land Tile Scheme for all days in the current 16-day processing period.</p> <p>Note: PGE23 is only run for Terra and Combined Terra + Aqua production.</p> <p>PGE25 has two profiles., PGE25 and PGE25 (Q profile). Both profiles require the same input ESDTs, except for the following. PGE25 requires MOD09GHK and MODPTHKM. PGE25 (Q) requires MOD09GQK, MODPTQKM and MODPTHKM. PGE25 creates MOD13A1. PGE25 (Q) creates MOD13Q1. Both profiles produce MOD_SS and MODLM_QA..</p>	PGE23 Level 3 16-Day Bi- Directional Reflectance Distribution Function/ BARS	Period Start of 16 Days, “Smart” Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAGAGG, MOD43LUA(Static), MOD43LUP(Static), MOD43LUT(Static)	(Currently only Terra or Combined Terra + Aqua products are made.) M{O,C}D43B1, M{O,C}D43B2, M{O,C}D43B3, M{O,C}D43B4, M{O,C}D43B1C, M{O,C}D43B2C, M{O,C}D43B3C, M{O,C}D43B4C, MOD_SS, MODLM_QA, BROWSE	16 Days	16 day 294 tiles / 16 days
		PGE25 Level 3 16-Day Vegetation Indices 250m and 500m	Period Start of 16 Days, “Smart” Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MOD09GHK, MOD09GQK, MOD09GST, MODPTQKM, MODPTHKM, MODMGGAD	MOD13A1, MOD13Q1, MOD_SS, MODLM_QA, BROWSE	16 Days	16 day 286 tiles /16 days
		PGE35 Level 3 16-Day Vegetation Indices 1km	Period Start of 16 Days, “Smart” Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	3	MODAGAGG	MOD13A2, MOD13A2C, MOD_SS, MODLM_QA, BROWSE	16 Days	16 day 286 tiles /16 days
L12a	Completion of recipe L4 and L5 for all tiles in the Land Tile Scheme for all days in the current 16-day processing period.	PGE72 Level 4 16-Day Vegetation Intermediate Composite	Period Start of 16 Days, “Smart” Start of Year, Optional Input, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	4	MODPTQKM, MOD09GQK, MODMGGAD, MOD09GST, MODPTHKM, MOD09GHK, MOD14GD, MOD11A1, MOD44LUC (Static)	MOD44CQ, MOD44CH, MOD44CT, MODLM_QA	16 Days	16 day 286 tiles /16 days
L13	<p>Completion of Recipe L12 for all 16-day tiles of input data in the Land Tile Scheme for PGE23.</p> <p>Note: Currently the only available input products from Recipe L12 that are available for input to PGE24, PGE65, and PGE82 are either the Terra MOD43B* or the Combined Terra + Aqua MCD43B*; the corresponding Aqua products are not produced. These PGEs in Recipe L13 make only Terra or Combined products.</p>	PGE24 Level 3 16-Day Albedo CMG	Period Start of 16 Days, “Smart” Start of Year, Min. # of Granules	3	M{O,C}D43B3 (Terra or Combined Terra + Aqua products)	(Currently only Terra or Combined Terra + Aqua products are made.) M{O,C}D43C1, MODLM_QA	16 Days	16 day 1 file / 16 days
		PGE65 Level 3 16-Day Bi- Directional Reflectance Distribution Function / Albedo CMG	Period Start of 16 Days, “Smart” Start of Year, Min. # of Granules	3	M{O,C}D43B1 (Terra or Combined Terra + Aqua products)	(Currently only Terra or Combined Terra + Aqua products are made.) M{O,C}D43C2, MODLM_QA	16 Days	16 day 1 file / 16 days

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
		PGE82 Level 3 16-Day Nadir BRDF- Adjusted Reflectance CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	M{O,C}D43B4 (Terra or Combined Terra + Aqua products)	(Currently only Terra or Combined Terra + Aqua products are made.) M{O,C}D43C3, MODLM_QA	16 Days	16 day 1 file / 16 days
L14	Completion of Recipes L10 and L12 for all tiles in the Land Tile Scheme for all days in the current 32-day processing period. Note: PGE40 is currently run only for Terra production; thus input of MYD43* or MCD43* is not an issue.	PGE40 Level 3 32-Day Land Cover	Period Start of 32 Days, "Smart" Start of Year, Optional Inputs, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD13A2, MOD11A2, MODAGTEX, MOD43B1, MOD43B4, MOD35ANC (Static)	MOD12M, MOD_SS, MODLM_QA	32 Days	32 day 286 tiles/32 days
L14c	Completion of Recipe L12 for all tiles in the Land Tile Scheme for all days in the current calendar month processing period.	PGE26 Level 3 Monthly Vegetation Indices 1km	Period Specification, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD13A2	MOD13A3, MODLM_QA	1 Month	1 month 286 tiles / month
L15	Completion of Recipe L7 for all 8 days in the current processing period.	PGE58 Level 3 8-Day Land Surface Temperature CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MOD11C1	MOD11C2, MODLM_QA	8 Days	8 day 1 / 8 days
L16a	Special initialization run of L16a is required at the beginning of each calendar year for all tiles in the Land Tile Scheme. Completion of Recipe L10 for all tiles in the Land Tile Scheme for the 8-day processing period corresponding to input MOD15A2 that overlaps the current day processing period. Currently MOD12Q1 is staged from the static file area	PGE36 Level 4 Daily Net Photosynthesis	Period Specification, Advanced Temporal, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules, File Update	4	MOD17A1 (Update), MOD15A2, MOD12Q1, D4LAXMNT, MOD17LUT(Static)	MOD17A1(Update), MODLM_QA	1 Day	1 day 286 tiles / day

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L16b	Completion of Recipe L16a for all tiles in the Land Tile Scheme for all days in the current 8-day processing period. Currently MOD12Q1 is staged from the static file area	PGE37 Level 4 8-Day Net Photosynthesis	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules, File Update	4	MOD17A1(Update), MOD15A2, MOD12Q1, MOD17LUT(Static)	MOD17A2, MOD17A2C, MOD17A1(Update), MOD_SS, MODLM_QA	8 Days	8 day 286 tiles / 8 days
L16c	Completion of Recipe 16b for all tiles in the Land Tile Scheme for all days in the current year processing period. PGE38 requires at least 1 of the last 3 MOD15A2 8-day files of the current year as input from PGE34 in Recipe L10. Currently MOD12Q1 is staged from the static file area	PGE38 Level 4 Yearly Net Primary Production	Period Specification, Lat/Lon Tiling, Runtime Parameters, Advanced Temporal, Optional Inputs, Min. # of Granules, File Update	4	MOD17A1(Update), MOD15A2, MOD12Q1, MOD17LUT(Static)	MOD17A3, MOD17A3C, MOD17A1(Update), MOD_SS, MODLM_QA	1 Year	1 year 286 tiles / year
L17	Completion of Recipe L7 for all days in the current calendar month processing period.	PGE59 Level 3 Monthly Land Surface Temperature CMG	Period Specification, Min. # of Granules	3	MOD11C1	MOD11C3, MODLM_QA	Month	1 month 1 / month
L18	PGE41 is run quarterly even though its output product is a yearly product. Currently MOD12Q1 is delivered by the SCF, staged from the static file area, and exported to the EDC DAAC.	PGE41 Level 3 Yearly Land Cover Quarterly	Period Start of 96 Days, "Smart" Start of Year, Advanced Temporal, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MOD12Q1(Prev.), MOD12LUT(Static)	MOD12Q1, MOD12Q1C, MOD_SS, MODLM_QA	96 Days	96 day 317 tiles / 96 days
L19	Completion of Recipe L18 for current processing period. PGE42 is run quarterly even though its output product is a yearly product. Currently MOD12Q1 is staged from the static file area	PGE42 Level3 Yearly Land Cover Quarterly CMG	Period Start of 96 Days, "Smart Start of Year, Min. # of Granules	3	MOD12LCD (Static)	MOD12C1, MODLM_QA	96 Days	96 day 1 file / 96 days
L20	Completion of Recipe L12a for all 16-day periods in current 96-day period. Required inputs to PGE66 are at least one MOD44CH and MOD44CQ in current period and at least one matching MOD44CH and MOD44CQ from 1 year previous to current period; optional inputs are matching MOD44CH and MOD44CQ from 3 months prior to current period; Previous 96-day MOD44A is optional.	PGE66 Level 3 96-Day Vegetation Cover Conversion 250m	Period Start of 96 Days, "Smart" Start of Year, Advanced Temporal, Optional Inputs, Meta. Based Query, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MOD44CH, MOD44CQ, MOD44A (Prev.), MOD44LUT(Static)	MOD44A, MOD_SS, MODLM_QA	96 Days	96 day 286 tiles / 96days

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
L21	Completion of Recipe L5P for all tiles for the current processing day. Note that all tiles for the day are staged for 1 instance of the PGE.	PGE84 Level 3 Daily Sea Ice Extent and IST at 4km	Period Specification	3	MOD29P1D	MOD29E1D, MODLM_QA	1 Day	1 day 1 / day
L23	Completion of Recipe L12 for all tiles for the current processing day.	PGE27 Level 3 16-Day Vegetation Indices CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MOD13A2	MOD13C1, MODLM_QA	16 Days	16 day 1 / 16 days
Ephem	For Terra: Receipt of 2 hours of AM1EPHN0 from GDAAC for current daily processing period ; 2-hour file starting at 12 noon is preferred. For Aqua: Receipt of daily PM1EPHND from GDAAC for current daily processing period.	PGE76 Level 1 Daily Ephemeris Predictor	Basic Temporal , Advanced Temporal, Runtime Parameters	1	AM1EPHN0 or PM1EPHND	AM1EPHH, AM1EPHH1, AM1EPHH2, AM1EPHH3 or PM1EPHH, PM1EPHH1, PM1EPHH2, PM1EPHH3	1 Day	1 day total of 4 predicted / day
O0a	Receipt of each 6-hour GDAS_0ZF from GDAAC (4 files per day) within the current processing day.	PGE17 Oceans Ancillary Meteorological Preprocess	Basic Temporal	n/ a	GDAS_0ZF	MODOCNMC	6 Hours	6 hours 4 files / day
O0b	Receipt of daily OZONEEP from GDAAC for the current daily processing period.	PGE19 Oceans Ancillary Ozone Preprocess	Basic Temporal	n/ a	OZONEEP or OZ_DAILY (if OZONEEP is not available)	MODOCOZN	1 Day	1day 1 file / day
O0c	Receipt of weekly REYNSST from GDAAC overlapping the current Oceans L2 processing period.	PGE18 Oceans Ancillary Reynolds SST Preprocess	Basic Temporal	n/ a	REYNSST	MODOCREY	1 Week	1 week 1 file / week

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
O1	<p>Receipt of all Level 1 5-minute granules of data from GDAAC within the current processing period.</p> <p>Completion of Recipe O0a covering current processing period plus files covering +/- 6 hours from start and end of current processing period.</p> <p>Completion of Recipe O0b covering current processing period plus files covering previous and following days.</p> <p>REYNSST 3-week file nearest current processing period ; stage previous week file</p> <p>AM1EPHH daily ephemeris file for day matching current processing period plus 3 previous files and 3 following daily files of AM1EPHH{1,2,3}.</p>	PGE10 Level 2 Sea Surface Temperature	Basic Temporal, Advanced Temporal, Nearest Temporal Match	2, 3	MOD021KM, MOD03, MODOCNMC, MODOCOZN, MODOCREY, AM1EPHH (Terra), PM1EPHH(Aqua), MOD28LUT(Static), MOD28PAR (Static), MODOCBIN(Static), MOD28RAD (Static), MOD28LST (Static)	MOD28L2, MOD28QC, MOD28Bmm, MODSQBrr MOC28L2, MOC28QC In PGE10, MOD28BD2 is produced but not archived.	1 Day	5 min. 288 granules / day
		PGE09 Level 2 Ocean Color	Basic Temporal, Advanced Temporal, Meta. Based Query, Nearest Temporal Match	2, 3	MOD021KM, MOD03, MOD28L2 (Terra), MOD28QC (Terra), MODOCNMC, MODOCOZN, MODOCREY (Aqua), AM1EPHH (Terra), PM1EPHH (Aqua), MODOCLUT(Static), MODOCAER(Static) MODOCBIN(Static), MODOCRAY(Static) MODOCRAD (Static), MOD28LST (Static)	MODOCL2, MODOCL2A, MODOCL2B, MODOCQC, MODOCBnn, MODOQBqq, MOCOCL2, MOCOCL2A, MOCOCL2B, MOCOQC	1 Day	5 min. 165 granules / day
		PGE79 L1B Geographic Cutout Subsetter	Basic Temporal	2	MOD021KM, MOD28LST (Static)	MOC021KM	1 Day	5 min. 288 granules / day
O2	<p>Completion of Recipe O1 for current daily processing period.</p> <p>Note: Recipe O2 is run once for each of the 39 Ocean parameters and 35 QA parameters.</p>	PGE20 Level 3 Daily Oceans	Period Specification, Data Day, Runtime Parameters	3	MODSQBrr, MODOCBnn, MODOQBqq, MOD28Bmm, MODOCTB(Static), MODOCSPC(Static) MODOCMAP(Static)	MODOCDnn or MOD28Dmm or MODOQAqq or MODSQArr, MO{04,36}MA##, MO{04,36,1D}{M,S,N,Q,F,1,2,3}Dpp MODOCFnn (Temporary) or MOD28Fmm (Temporary)	1 Day	1 day 39 Ocean params + 35 QA params / day

Recipe AM1M / PM1M / AMPM	Recipe and Special Data Dependencies	PGE Name	Production Rules	Lev	ESDT Input	ESDT Output	Recipe Time Range	Granule Period & Output
O4b	Completion of Recipe O2 for all 39 Ocean parameters for the current 8-day processing period.	PGE54 Level 3 8-Day Oceans	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters, Min. # of Granules	3	MODOCNnn, or MOD28Dmm, MODOCB(Static), MODOCSPC(Static) MODOCMAP(Static)	MODOCWnn or MOD28Wmm, MO{04,36,1D}{M,S,N,Q,F,1,2,3}Wpp ,MODOCFnn (Temporary) or MOD28Fmm (Temporary)	8 Days	8 day 39 Ocean params/ 8 days
O5	Completion of Recipe O4b for all 39 Ocean parameters for the current 8-day processing period. 9 daily D4LAXMNT files matching current 8-day processing period plus next file. 8 daily FNMOC_ML files matching the current 8-day processing period. For running yearly process: current plus 45 previous files of MOD27W.	PGE51 Level 4 8-Day and Running Yearly Oceans Productivity Indices	Period Start of 8 Days, "Smart" Start of Year, Optional Inputs, Data Day, Runtime Parameters, Min. # of Granules, Advanced Temporal	4	MODOCW27, MOD28WD1, FNMOC_ML, D4LAXMNT , MOD27LUT(Static), For Running Yearly process : MOD27W (current), MOD27W (45 from prev. year)	MOD27W, MOAPWAxx, MOAPWBxx, MOAPW1xx, MOD27Y, MOAPYAyy, MOAPYByy, MOAPY1yy	8 Days	8 day 1 / 8 days
O7	Completion of Recipe O2 and O4b for all 39 Ocean parameters for all days in current calendar month processing period.	PGE73 Level 3 Monthly Oceans	Period Specification, Advanced Temporal, Data Day, Runtime Parameters, Min.# of Granules	3	MODOCNnn, MODOCWnn, MOD28Dmm, MOD28Wmm, MODOCB(Static), MODOCSPC(Static) MODOCMAP(Static)	MODOCMnn or MOD28Mmm, MO{04,36,1D}{M,S,N,Q,F,1,2,3}Mpp, MODOCFnn (Temporary) or MOD28Fmm (Temporary)	1 Month	1 month 39 Ocean params / month
O8	Completion of Recipe O7 for all 39 Ocean parameters for current year processing period.	PGE74 Level 3 Yearly Oceans	Period Specification, Data Day, Runtime Parameters, Min. # of Granules	3	MODOCMnn or MOD28Mmm, MODOCB(Static), MODOCSPC(Static) MODOCMAP(Static)	MODOCNnn or MOD28Nmm, MO{04,36,1D}{M,S,N,Q,F,1,2,3}Npp, MODOCFnn (Temporary) or MOD28Fmm (Temporary)	1 Year	1 year 39 Ocean params / year

APPENDIX A: ACRONYMS AND ABBREVIATIONS

AM1	First AM Descending Equator Crossing Platform
ATBD	Algorithm Theoretical Basis Document
BRDF	Bi-directional Reflectance Distribution Function
CMG	Climate Modeling Grid
CPU	Central Processing Unit
DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
DAS	Data Assimilation System
DPR	Data Processing Request
DPS	Data Production Software
EASE-Grid	Equal-Area Scalable Earth Grid
ECS	EOSDIS Core System
EDC	EROS Data Center
EGS	EOS Ground System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Type
FDD	Flight Dynamics Division
FOS	Flight Operations Segment
FPAR	Fraction Photosynthetically Active Radiation
GDAS	Global Data Assimilation System
GES	Goddard Earth Sciences
GMT	Greenwich Mean Time
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
I/O	Input/Output
ICD	Interface Control Document
IDL	Interactive Data Language
IFOV	Instantaneous Field-Of-View
IMSL	Information Management System Library
IT	Instrument Team
JPL	Jet Propulsion Laboratory
L1	Level 1
L1A	Level 1A
L1B	Level 1B
L2	Level 2
L2G	Level 2 Gridding
L3	Level 3
L4	Level 4
LAI	Leaf Area Indices
LP	Land Process
LST	Land Surface Temperature
LUT	Look-Up Table
MAPI	MODIS-Application Program Interface
MAST	MODIS Administrative Support Team
MCF	Metadata Configuration File

MCST	MODIS Characterization Support Team
MODAPS	MODIS Data Processing System
MODIS	Moderate Resolution Imaging Spectroradiometer
NCEP	National Center for Environmental Prediction
NCSA	National Center for Supercomputing Applications
NISE	Near Real-Time Ice and Snow Extent
NMC	National Meteorological Center
NPP	Net Primary Production
NSIDC	National Snow and Ice Data Center
PCF	Process Control File
PGE	Product Generation Executive
PM1	First PM Ascending Equator Crossing Platform
PSA	Product Specific Attribute
PSN	Net Photosynthesis
QA	Quality Assurance
SCF	Science Computing Facility
SDD	System Description Document
SDP	Science Data Processing
SDP S/W	Science Data Processing Software
SDPS	Science Data Processing Segment
SDPTK	Science Data Production Toolkit
SDST	Science Data Support Team
SGI	Silicon Graphics Inc.
SMF	Status Message Facility
SPSO	Science Processing Support Office
SSI&T	Science Software Integration and Test
SST	Sea Surface Temperature
SSTG	Science Software Transfer Group
STM	Science Team Member
TBD	To Be Determined
TLCF	Team Leader Computing Facility
UMD	University of Maryland
URL	Universal Resource Locator
UTC	Universal Time Coordinated
V2.0	Version 2.0
V2.1	Version 2.1
V2.2	Version 2.2
V3.0	Version 3.0
V4.0	Version 4.0
V6	Version 6
WGS84	World Geodetic System 84
WWW	World Wide Web

APPENDIX B: REQUIREMENTS TRACEABILITY

TABLE B-1. VERSION 4.0 REQUIREMENTS TRACEABILITY MATRIX

MSDPS Requirements Spec*	Description	MSDPS V4.0 SDD Traceability
Software Process Requirements		
3.3	A software process is defined as any element of executable software listed in Table 3-1.	3.2.1
3.2-1	The software processes listed in Table 3-2 are the complete set of processes that shall be incorporated in the MODIS SDP S/W Release.	3.2.3
3.2-1	The output of the V2 software processes shall be consistent with the MODIS Data Product Catalog, which is available on-line at URL http://modarch.gsfc.nasa.gov/MODIS/DATAPROD/dataprodcatalog.html .	3.4
Science Data Processing Software Product Requirements		
4.1-1, 5.1	A MODIS product shall be defined as any data file identified with a Product ID in Table 3-3-1.	3.4
4.1-1	The definition of the level of a given product shall adhere to Table 3-1, MODIS Data Level Definitions.	3.1
Operations Requirements		
6.1	The V3.0 Release shall integrate all software processes available to the SDST software integration team into a SDP S/W system that executes all processes in the MODIS TLMF, and executes the processes in the GSFC DAAC, EDC DAAC, and the National Snow and Ice Data Center (NSIDC) DAAC (if available in Release A) as specified in Table 3-1.	3.1, 3.2, 7
6.1	A PGE shall execute MODIS software processes within the ECS environment.	3.1, 3.2, 7

*MODIS Science Data Processing Software Requirements Specification Version 3 and Beyond, SDST-089, Change Notice 1; November 10, 1997.

APPENDIX C: PRODUCTION RULES USED BY MODIS PGES

C.1 Temporal

1. Basic Temporal: Activation based on start date/time and end date/time for output data.

Assumptions: Input data temporal range matches output data temporal range.

Requires: Specification of output data temporal range.

Specification of processing start date/time (i.e., start date/time of the period of processing based on the frequency of data availability).

Data Processing Centers: GSFC DAAC , MODAPS

PGE Levels and Types: L1 5-Minute, L2 5-Minute

2. Advanced Temporal: Activation based on start date/time and end date/time of output data with either start or end for input offset by deltas applied to the output data temporal range.

Assumptions: The delta value may be positive or negative; a negative delta value applied to date/time would move the date/time back (earlier); a positive delta value applied to date/time would advance the date/time forward (later). Thus to extend both start and end boundaries, a negative delta would be applied to the start and a positive delta to the end. Granules in a delta range that is extended beyond the original Production Request specification usually have an associated availability time-out at which the Data Processing System is instructed to fail the PGE instance or to treat the input ESDTs as optional and run without them. For specific input ESDTs, the delta values may be expressed as a number of additional files at each end of the output data temporal range.

Requires: Specification of data range for the processing period.

Specification of start and stop temporal boundary deltas or corresponding numbers of files.

Data Processing Centers: GSFC DAAC , MODAPS

PGE Levels and Types: L1 5-Minute, Daily Ephemeris Prediction, L2 5-Minute, L2G Daily, L3 Daily, L4 Daily, L4 8-Day, L3 Monthly, L3 96-Day

3. Nearest Temporal Match (Closest Granule): Request and staging of the nearest input granule of an ESDT from the Data Processing Request time. The Data

Processing System will search either forward or backward in time for a specified period of time until it finds a granule that matches the request.

Assumptions: Rule is implemented with a wait time for re-tries if no file is found.

Requires: Specification of length for time period of the search for the query.

Direction of search, forward in time or backward in time or both.

Data Processing Centers: MODAPS

PGE Levels and Types: L2 5-Minute

C.2 Orbit

Orbit-Based: Activation is by orbit (PGE is scheduled per orbit) or by its associated time range. The orbit numbers and corresponding temporal ranges are maintained in an internal table and the temporal range of the input and output data for a specific PGE instance is determined by a Look-up-table.

Assumptions: The PGE will not be activated without availability of all granules for an orbit. The internal orbit number table will be updated frequently so that the data may be associated with an orbit as they become available. This production rule is usually accompanied by the Minimum Number of Granules Production Rule with associated wait times.

Requires: Specification of orbit number range in the Production Request.

Data Processing Centers: MODAPS

PGE Levels and Types: L2 5-Minute

C.3 Periodic

1. Period (Calendar) Specification: Activation is for a specified calendar period (day, week, month, or year)

Assumptions: The PGE will not be activated without availability of all granules for the period to be run. This production rule is usually accompanied by the Minimum Number of Granules Production Rule with associated wait times.

Requires: Specification of start and end for the production request.

Data Processing Centers: MODAPS

PGE Levels and Types: L2G Daily, L3 Daily, L4 Daily, L3 Monthly, L3 Yearly, L4 Yearly

2. **Period Start_of_(N)_Days:** Activation is for a selected period/cycle. The rule may be thought of as Start_of_Year for a period of N days rule.

Assumptions: Periods are calculated based on the beginning of the year by default. The PGE will not be activated without availability of all granules for the period to be run. This production rule is usually accompanied by the Minimum Number of Granules Production Rule with associated wait times.

Requires: Specification of start and end for the production request.
Specification of the duration of the period when the PGE is registered or installed. If the period is not to be based on start-of-calendar year for beginning the calculation, a start date/time for the cycle must also be specified.

Data Processing Centers: MODAPS

PGE Levels and Types: L3 8-Day, L4 8-Day, L3 16-Day, L3 32-Day, L3 96-Day

3. **Smart Start of Year:** Activation at the beginning of a new year resets the start of the selected period for production to the start of year as a default. Smart Start of Year has a option of inclusion of data from the next year at the last period of the year or allowing the last period of the year to have fewer days included in the products.

Assumptions: For a PGE using one of the Period Start_of_N_Days Production Rules, an end-of-year processing period which spans the beginning of the new year will complete by either including data processed for the new year up to the end of the period or by including only data processed for the end of the current year. The effective reset to start of year for the cycle results in redundant inclusion of any data from the new year that have been included in the last period of the previous year.

Requires: Specification of the values of "N" in the Period Start_of_N_Days and specification of whether days from the next year are to be included in the last period of the year or not included.

Data Processing Centers: MODAPS

PGE Levels and Types: L3 8-Day, L4 8-Day, L3 16-Day, L3 32-Day, L3 96-Day

C.4 Tiling

1. **Latitude/Longitude Tiling:** Activation is based on a tile specified in the Tile Definition File that contains the Tile ID and the Latitude/Longitude of the Tile Corners. The Tile ID may be passed back to the PGE as a runtime parameter and inserted in the PCF.

Assumptions: The PGE will be activated after a specified query delay time for the specified tile if there are any input granules available or if a minimum number is specified during registration or installation of the PGE. The PGE may make use of Minimum Number of Granules Production Rule, but the default is one granule.

Requires: Specification by the Data Processing System of the Tile ID for the tile to be processed or specification of the Latitude/Longitude from which the Tile ID may be determined.

Data Processing Centers: MODAPS

PGE Levels and Types: L2G Daily, L3 Daily, L4 Daily, L3 8-Day, L4 8-Day, L3 16-Day, L3 Monthly, L3 32-Day, L3 96-Day, L4 Yearly

2. **Zonal Tiling:** Activation is based on a Zone Definition File that contains the Latitude coordinates which bound the Zonal tile. The Latitude coordinates designate a zone extending around the Earth.

Assumptions: The PGE will not be activated without availability of all granules for the specified tile or a minimum number as specified during registration or installation of the PGE. The PGE may make use of Minimum Number of Granules rule.

Requires: Specification of the Zonal Definition File for the zone to be processed or specification of the Latitudes from which the zone can be determined.

Data Processing Centers: MODAPS

PGE Levels and Types: L3 Daily

C.5 Additional Inputs

1. **Alternate Inputs:** Activation is based on a hierarchy of choices of input files of a specified ESDT (first choice, second choice, etc.).

Assumptions: The PGE will not be activated unless one of several alternate inputs is available. One input is considered to be “primary” input. Each input has an associated time-out such that if the input is not available within the time-out period, processing will wait for the next alternate through its time-out period, and so on. If the primary input or a higher priority alternate becomes available during the wait period for a lower priority alternate, the PGE will be activated with the available primary input or higher priority alternate if that is the one that becomes available first. For most PGEs the last alternative is a static climatological file which is always available on the Data Processing System.

- Requires: Specification of each alternate, the preference order, and a time-out for each input.
- Specification of the first alternate as the primary.
- Specification of the category which groups the alternates and the runtime parameter which identifies which input is available.

Data Processing Centers: MODAPS

PGE Levels and Types: Ancillary Data Preprocessing

2. Optional Inputs: Activation is based on availability of one or more specified Optional Inputs of a specified ESDT within a time-out period, after which the PGE is activated without the Optional Inputs.

Assumptions: The PGE will not be activated until the time-outs have expired for the Optional Inputs. The PGE will be activated at that time without any of the Optional Inputs. The time-out for the Optional Inputs begins only after the required inputs are known to be available. The time-outs for multiple Optional Inputs are concurrently “counted down.”

- Requires: Specification of each optional input, a time-out for each input (optional), and a runtime parameter for each input to identify which input is available.

Data Processing Centers: GSFC DAAC, MODAPS

PGE Levels and Types: L1 5-Minute, L2 5-Minute, L4 8-Day, L4 16-Day, L3 32-Day, L3 96-Day, L4 Yearly

C.6 Metadata-Based Query and Activation

1. Metadata-Based Query: The Data Processing System queries its Databases to determine which granules of each required input ESDT are available. Activation is based on results of this query of metadata attributes of each specified ESDT for available granules that meet the query criteria.

Assumptions: The metadata attributes on which the Metadata-Based Query is to be made are already in the processing system’s database at the time the PGE instances are scheduled. Associated wait times for specific input ESDTs are also already in the database.

- Requires: Specification of all metadata attributes for all input ESDTs to be used for the Metadata-Base Query.

Specification of associated wait times for availability of granules of each ESDT to meet the Metadata-Based Query.

Data Processing Centers: MODAPS

PGE Levels and Types: L2G Daily, L3 Daily, L3 8-Day, L3 96-Day

2. Metadata -Based Activation: Activation is conditional based on metadata values of a single input data granule of an ESDT. If the expected granule for this data processing period has the required metadata values, the PGE is executed; if not, the PGE is not executed.

Assumptions: The metadata attributes on which the Metadata-Based Activation is to be made are already in the processing system's database at the time the PGE instances are scheduled.

Requires: Specification of all metadata attributes for the input ESDT to be used for the Metadata-Based Activation.

Data Processing Centers: MODAPS

PGE Levels and Types: L2 5-Minute

C.7 Minimum Number of Granules

Minimum Number of Granules: Activation is conditionally based on availability of a minimum number of data granules of a specified ESDT.

Assumptions: The PGE instance has at least one required input ESDT but will run without the full set of input granules of that type for the time span of the data processing period. The quality of the output granules may be reduced by running with fewer than the full set of input granules, but the quality is still good enough if at least a minimum number of input granules are available.

Requires: Specification of the time span of the data processing period for which the input granules are required so that the Data Processing System can determine the number of granules expected in the full set for the ESDT.

Specification of the minimum number of input granules of each ESDT that will ensure an acceptable quality of the output products.

Data Processing Centers: MODAPS

PGE Levels and Types: L2 5-Minute, L2G Daily, L3 Daily, L3 8-Day, L4 8-Day, L3 16-Day, L4 16-Day, L3 Monthly, L3 32-Day, L3 96-Day, L3 Yearly, L4 Yearly

C.8 Run-Time Parameters

Runtime Parameters: PGEs make use of two types of Runtime Parameters, Static and Dynamic. Dynamic Runtime Parameters are determined by the Data Processing System and passed to the PGE scripts at runtime. These are put into the instantiated PCF by the PGE script. Static Runtime Parameters are associated with the installed

versions of the PGEs. These are either embedded in the PGE script or the PGE code. If they are in the PGE script, it inserts them into the instantiated PCF.

The Ocean Data Day Production Rule is a special case for Oceans Processing in which an extended date and time beyond the current calendar day defines the "Ocean Data Day". It is determined from fixed delta times provided by the MODIS Oceans Group. At the Level 2 PGE processing the Data Processing System uses the information provided to determine the date and time before and after the current processing data day to bracket the current Ocean Data Day and passes this information to the PGE instance. The PGE uses this information to set the Ocean "start and end dataday" in output space-binned granules of ESDTs. Each of the space-binned granules may have their Ocean Data Day set to the current day, the previous day, or the subsequent day. For Level 3 daily PGE processing, the Data Processing System uses the "start and end dataday" in the input granules to stage the data that belong to the current Ocean Data Day and passes the "start and end dataday" to the PGE as runtime parameters. For subsequent 8-day through yearly PGEs, the Data Processing System passes the bracketing "start dataday" and "end dataday" runtime parameters to the PGEs and stages the data for granules with data days that fall within the bracketing values of these runtime parameters.

Assumptions: The Dynamic Runtime Parameters are determined by the Data Processing System and passed to the PGE script at runtime. The Static Runtime Parameters are known to the PGE script or to the PGE itself.

Requires: The Data Processing System passes the Runtime Parameters to the PGE instances.

The PGE script builds the instantiated PCF and inserts the relevant Runtime Parameters into the PCF.

Data Processing Centers: MODAPS

PGE Levels and Types: L2 5-Minute, L2G Daily, L3 Daily , L4 Daily, L2 8-Day, L4 8-Day, L3 16-Day, L4 16-Day, L3 Monthly, L3 32-Day, L3 96-Day, L3 Yearly, L4 Yearly

C.9 File Update

File Update: A Production Rule allowing files to be staged for updating by PGEs and archived when the PGE has completed its run is provided by MODAPS, but was not allowed by ECS.

Assumptions: The Data Processing System ensures that the planning and scheduling is performed such that the update files will be created by the PGEs on the day required and that they will be available for subsequent runs of PGEs. If any there is any order in which a PGE must run, this order will be correctly performed. The update file is opened with modify access by the PGEs.

Requires: The file to be updated is available online for the PGEs that read and write to it at the time the PGE is scheduled for execution.

The Data Processing System keeps track of the file and ensures that it is updated by subsequent PGE runs in the correct order specified in the Production Rule.

The Data Processing System allows only one PGE instance to update the file at any one time.

Data Processing Center: MODAPS

PGE Levels and Types: L3 Daily, L4 Daily, L4 8-Day, L4 Yearly